Do Harm Severity and Incident Apparentness Influence Physicians' Willingness to Disclose Medical Errors and Adverse Events to Patients and Their Families?

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Abstract

This study examines how harm severity and apparentness influence physicians' willingness to disclose medical errors and adverse events to patients and their families using a cross-sectional, mixed-mode study design. A simple random sample of 1,565 physicians was selected from a list of licensed Minnesota physicians provided by the Minnesota Board of Medical Practice. In total, 341 physicians had only a postal address on file. The remaining 1,224 physicians had both a postal and email address on file, so they were randomly assigned to one of four modes of survey administration: mail-only, mail-web, web-mail, and web-only. Afterwards, all physicians were randomly assigned to receive one of the Disclosure of Medical Errors or Disclosure of Adverse Events Surveys. All data was collected between November of 2017 and February of 2018.

The overall response rate was 18% (n = 292), and there was not a statistically significant difference in the response rate across survey modes. Most respondents were non-Hispanic (98%), white (89%), and male (69%). On average, respondents reported that they are likely to disclose medical errors ($\bar{x} = 7.47; sd = 1.56$) and adverse events (($\bar{x} = 9.04; sd = 1.14$) to patients and their families. Across all model specifications, the probability of physicians being highly likely to disclose medical errors and adverse events is high, regardless of harm severity and malpractice risk. As apparentness increases so does the probability that physicians will be highly likely to disclose medical errors (not readily apparent: 0.66, somewhat apparent: 0.72, readily apparent: 0.95; $p < 0.001$) and adverse events (not readily apparent: 0.59, somewhat apparent: 0.67, readily apparent: 0.93; $p < 0.001$).

While physicians reported being likely to disclose medical errors and adverse

events, they may not disclose when faced with a situation that warrants disclosure. Future research should examine whether physicians' actions align with their beliefs as well as whether the information they provide to patients during disclosure conversations is meetings patients' informational needs.

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Chapter I: A Historical Overview of the United States' Medicolegal Environment

In the United States, injured patients rarely sued for medical malpractice prior to the 1830s (De Ville, 1992; De Ville, 1998; Mohr, 2000). Numerous societal factors contributed to the dearth of malpractice lawsuits entering the court system. First, according to De Ville (1992, 1998), many Americans believed in divine providence, the notion that everything that happens in the world, from natural disasters to armed conflicts to death and disease, is under God's control. God inflicts individuals with physical and mental ailments to test their faithfulness and/or punish them for their sins. If God is the root cause of death and disease, then "it was fruitless to look for human causation or to assign blame…Humble acceptable of God's will…would be the appropriate response to physical misfortune" (De Ville, 2004, pg. 146). If individuals struggled to accept the misfortune that afflicted themselves or their loved ones, then they were expected to "'ask [God] for a submissive spirit'" (Saum, 1976, pg. 339). Basically, many individuals thought it was pointless and socially unacceptable to sue for adverse health outcomes.

However, by the mid-1800s, Americans' belief in divine providence was waning as "religious reform movements stressed human perfectibility over human depravity" (De Ville, 1998, pg. 199). As a result, individuals became increasingly concerned with improving their spiritual and physical health through lifestyle changes and the utilization of health care services. Patients' health was now under their physicians' control, not God's control. When the care they received did not meet their expectations or resulted in an untoward outcome, patients began blaming their physicians and seeking redress by filing lawsuits (De Ville, 2004). It was becoming more socially acceptable for patients to sue for malpractice.

In addition to the changes in the values and beliefs concerning the nature of life, there are the dramatic changes associated with the Industrial Revolution. Prior to industrialization, many Americans lived their lives according to the principles of collectivism, the notion that individuals should not be autonomous beings, pursuing their own goals (Tönnies, 2001). Instead, they should sacrifice their "values and goals for the group's 'greater good'" (Biddle, 2012, pg. 1). Since a family's economic survival depended on each members' contributions, everybody in a household, including children, were expected to, and did, contribute to the household. Thus, it was common to see adults and children working side-by-side in the fields and in factories, doing things like ploughing, planting crops, and sewing garments, as needed. Extended family members also lived close together, if not in the same dwelling as their children and grandchildren, and contributed to the overall well-being of the larger family unit. Within this social structure, health care was largely communal with families caring for themselves (Starr, 1982). The societal and market penetration of medical insurers and professionals was quite limited (Durkheim, 1964; Weber, Roth, & Wittich, 1978; Starr, 1982; Collins, 1999).

At the dawn of the nineteenth century, the United States was in the throes of the Industrial Revolution (Park & Burgess, 1921; Weber et al. 1978). Technological innovations and mechanization led to the creation of large factories (Marx, Engels, & Tucker, 1978), the rise of specialization (Durkheim, 1964), impersonal economic transactions (Field, 2011), and a shift in the population from rural to urban areas (Field, 2011). This shift from personalized, rural life to depersonalized, urban life resulted in individuals becoming less hesitant to sue others, including physicians (De Ville, 1998)—

behavior that is consistent with the relational distance hypothesis. It postulates that individuals who are involved in a deep, interpersonal relationship prefer to resolve any grievances that arise amongst themselves while those who do not have such a deep relationship (e.g. strangers, casual acquittances, etc.) prefer to resolve their grievances in court (Greenhouse, 1982). The latter do not have to worry as much about disrupting their communal way of life or straining important social relationships (Greenhouse, 1982; De Ville, 1998). This was a sign that the societal belief in collectivism was being replaced with individualism (Tönnies, 2001). The latter is the belief that individuals are autonomous beings who are free to live their lives as they see fit and develop their own worldviews, even if it conflicts with others' beliefs and values (Biddle, 2012).

Field (2011) claims that improvements in transportation facilitated the diffusion of medical information. Improved transportation allowed physicians to interact with their colleagues in other regions of the country. Through these interactions, they learned about recent medical advances and developed and disseminated standards of care. While the dissemination of medical knowledge improved patient care, it also gave rise to malpractice litigation. In court, the standards could be introduced as evidence that physicians were not providing the best care possible.

In addition to revolutionizing the means of production, mechanization contributed to changes in individuals' perceptions of the perfectibility of the human body. Scientific advancements and mechanization allowed individuals to alter and subdue their physical environment (Catton, 1980, 1985, & 1986). Witnessing the marvels of mechanization, many individuals started believing that they could control all aspects of their world, including their bodies. Gradually, they began to view the "human body as if it were a

thing that could be manipulated and fixed, like any other machine and like other aspects of the natural world" (De Ville, 1992, pg. 110). As a result, they expected medical breakthroughs to completely restore their health and well-being. Basically, they expected a cure with no adverse side effects. Many physicians contributed to patients' beliefs by promising to cure them (De Ville, 1992; Mohr, 2000). When physicians did not deliver on their promises, many patients did not hesitate to sue them for malpractice.

Table 1 displays the number of malpractice cases that went before an appellate court in the nineteenth and early twentieth centuries. Prior to the mid-1800s, patients rarely sued for medical malpractice (De Ville, 1992). Between 1790 and 1830, only two known cases of malpractice went before an appellate court judge (Olsen, 1996). But, shortly thereafter things began to change. Between 1835 and 1865, the courts witnessed a dramatic increase in malpractice lawsuits (De Ville, 1992; Mohr 2000), denoting the first medical malpractice crisis in U.S. history. Forty-six cases of malpractice went before an appellate court judge between 1830 and 1870 (Olsen, 1996).

Table 1: Number of Appellate Malpractice Cases, 1790 –1930

Time Period	Cases
1790 –1830	2
1830—1840	5
1840—1850	3
1850—1860	13
1860—1870	25
1870—1880	45
1880—1890	47
1890—1900	77
1900—1910	114
1910—1920	277
1920—1930	400

Source: Olsen (1996)

However, it should be noted that only a fraction of malpractice cases decided by a

trial court[1] end up going before an appellate court judge (Smith, 1941; Sandor, 1957; Olsen, 1996). Dissatisfied litigants may be unable to appeal the trial court's decision because they do not have sufficient legal grounds for an appeal, cannot afford to hire an appellate attorney—they rarely work on a contingency fee basis—or do not want to deal with the mental or emotional anguish associated with the appeals process (Bader, 2015). Considering this, it is highly likely that the number of malpractice claims decided by a trial court greatly exceeds the number of appellate cases identified by Olsen (1996). Unfortunately, according to Burns (1969), Olsen (1996), and Mohr (1993) reliable data on the number of malpractice claims decide by a trial court during the 1800s and early 1900s is not readily available.

According to Spiegel and Kavaler (1997), many of the claims filed between 1835 and 1865 involved orthopedic care, namely fractures and dislocations. Many physicians promised patients that their bones would heal perfectly. However, this was highly unrealistic, given the primitive state of medical knowledge (Starr, 1982). As such, patients often ended up with deformed, shortened, or crooked limbs, which prompted them to sue for malpractice. Speaking on the causes of malpractice before the Medico-Legal Society of New York on March 25, 1875, Hamilton (1875), a physician, stated, "They [physicians] declared that they could do many things which they could not; and their patients have simply taken them at their word, and required of them damages when

[1] The U.S. judicial system is made up of a series of trial courts and appellate courts. Initially, malpractice cases must be tried in a trial court. During trial court proceedings, the plaintiff(s) and defendant(s) present their claims with supporting evidence before a judge and jury. Once both sides have pleaded their case, the jury considers the information presented and renders a verdict. If either the plaintiff or defendant is unsatisfied with the jury's decision, they can file an appeal, sending the case to an appellate court for review. In an appellate court, a judge, not a jury, is responsible for reviewing the case and either upholding or reversing the trial court's decision.

they have fallen short of their own claims and promises" (pg. 103). In court, disgruntled patients could easily demonstrate the botched results of their physicians' handiwork. In 1895, a Minnesota court ruled that promising a cure when one cannot be guaranteed constitutes malpractice (Harrison, Worth, & Carlucci, 1985).

Feeling professionally attacked by what they perceived as overly litigious patients and unscrupulous lawyers, some physicians searched for and implemented strategies intended to prevent legal entanglements (Wood, 1849; Mohr, 1993)—which could be considered the earliest form of defensive medicine. For instance, some physicians tried to limit the types of procedures they would perform. Writing on the state of affairs in Pennsylvania, Wood (1849) states, "'One of the most able and experienced practitioners here, now refuses to take the responsibility of surgical cases, and feels constrained to turn the applicants away to find help where they can'" (pg. 400). Alternatively, if physicians felt morally or financially compelled to take a case that they believed could result in a lawsuit, then they might have asked patients to agree not to sue them prior to caring for them (Wood, 1849). Furthermore, some scholars of medical jurisprudence provided physicians with strategies for avoiding a lawsuit (Mohr, 1993). For example, in an article published in the *Boston Medical and Surgical Journal,* March (1847) recommended that physicians ask one, or more, of their colleagues to serve as witnesses, observing and documenting, in detail, their diagnosis and treatment of patients. In the event of a lawsuit, they could ask these witnesses to testify on their behalf.

According to De Ville (1992) and Spiegel and Kavaler (1997), weak to non-existence state licensure laws contributed to this deluge of malpractice lawsuits. Since anyone could enter the health professions, there was intense competition for patients

amongst physicians and between physicians and alternative healers, like barbers, homeopaths, osteopaths, and herbalists (Starr, 1982). To bolster their practice and social standing, some physicians openly denigrated the therapeutic practices of their competitors. Even though the therapeutic practices of many alternative healers were just as ineffective and potentially harmful as those of physicians, patients often did not sue them because they were not as wealthy as physicians (De Ville, 1992; Mohr, 2000). They also did not promise a perfect outcome or a cure (Spiegel & Kavaler, 1997). Basically, patients had a better chance of obtaining compensation from physicians than alternative healers, provided the jury ruled in their favor. Physicians compensated patients using their personal assets until the late nineteenth century when they started forming mutual insurance companies to protect themselves from financial ruins (Starr, 1982; Mohr, 2000).

While the prospect of financial gain undoubtedly enticed some patients to sue for malpractice, they still had to find a lawyer willing to represent them. According to De Ville (1992), the increase in the number of people entering the health professions was accompanied by an increase in the number of people entering the legal profession, sparking intense intra-professional competition amongst lawyers. In response to economic realities, many lawyers attempted to expand case law by trying novel cases and providing representation to plaintiffs on a contingency fee basis. Under a contingency fee arrangement, plaintiffs do not pay their lawyers upfront. Instead, if they win their case, they get a percentage of their plaintiffs' winnings. If they lose their case, then they do not receive any compensation (American Bar Association, 2015). On the one hand, contingency fee arrangements may have made it financially easier for poor patients to

obtain legal representation and sue for malpractice (Field, 2011). On the other hand, they could have made it difficult for patients with legitimate injuries, but small, expected winnings, from obtaining representation. Lawyers might refuse to take cases that they believe are not profitable (Shepard, 2008).

Furthermore, Mohr (2000) argues that three aspects of the medicolegal environment have, and will continue to, contribute to an increase in malpractice litigation, namely medical innovation, medical liability insurance, and contingency fee arrangements. In the medical marketplace, researchers and providers often are driven by an ideology of continuous improvement through technological innovations and medical breakthroughs, ever striving for safer, more effective therapeutic interventions. New, approved therapies not only have the potential to improve patients' health and well-being but also harm them significantly. This is particularly salient in the long-run when their risks and side effects are still being uncovered as part of phase IV trials, which can vary in terms of their scientific rigor (Zhang et al., 2016). When patients experience unanticipated harm, they may sue, increasing the incidence of litigation. In fact, an increase in the incidence of malpractice litigation has always accompanied changes in medical knowledge and innovation (De Ville, 2004).

De Ville (1998) argues that the number of malpractice lawsuits should decrease over time as physicians gain experience using new interventions, discover the risks and side effects associated with its use, and institute precautions to minimize injury and death. Once physicians discover the potential side effects, they can better inform patients of the benefits and risks associated different procedures. In turn, this should give patients a more accurate understanding of the procedure's effectiveness, reduce dissatisfaction

with imperfect outcomes and side effects and reduce their propensity to sue for malpractice.

Contemporary malpractice scholars claim that the first malpractice crisis occurred in the 1970s (Mech, 2003; Mello, Studdert, & Brennan, 2003; Thorpe, 2004; Gregory, 2005); however, they are overlooking the first crisis identified by De Ville (1992). In the 1970s, increasing rates of malpractice litigation and more severe iatrogenic injuries caused liability insurers to sustain significant financial losses (Robinson, 1986; Sage, 2004a). In response to this, some insurers stopped writing policies, leading to a "crisis of [insurance] availability" (Sage, 2004a, pg. 12). Medical societies, and physicians, established physicians' mutuals to provide insurance and fill the gaps in coverage left by commercial liability insurers (Sage, 2004a). Meanwhile, state legislatures enacted policies aimed at regulating the medicolegal environment, such as non-economic damage caps, periodic payment reforms,[2] and collateral-source rule reforms[3] (Avraham, 2006).

One of the key responses to the second crisis was the implementation of non-economic damage caps. In 1975, California enacted the first cap on non-economic damages (Avraham, 2006), limiting the amount of money that successful malpractice plaintiffs could receive for the pain and suffering associated with their iatrogenic injuries. Since then researchers have studied their effect on insurance premiums and jury awards for non-economic losses (Danzon, 1984; Danzon, 1986; Viscusi, Zeckhauser, Born, & Blackmon, 1993; Danzon, Epstein, & Johnson, 2004; Thorpe, 2004; Viscusi & Born,

[2] Under periodic payment reforms, malpractice insurers must pay injured patients in a series of payments made over time. They cannot pay them in a single, lump-sum payment.
[3] Under collateral-source rule reforms, the judiciary is required to reduce injured patients' malpractice awards if they are receiving payments from other sources. For example, if they are receiving care for iatrogenic injuries that are paid for by their health insurance, then they will not be reimbursed for those medical bills.

2005). While malpractice premiums have been rising over time, they are lower in states with caps than in states without caps. Caps lead to a 6-13% decrease in premium growth (Mello, 2006). Caps lower premiums by reducing insurers' payouts for pain and suffering, which vary considerably from case-to-case (Bovbjerg, Sloan, & Blumstein, 1989; Sloan & Hsieh, 1990; Studdert, Yang, & Mello, 2004). Overall, damage caps are associated with a 23-31% reduction in jury awards (Mello, 2006).

While non-economic damage caps appear to be fulfilling their intended purpose, they are associated with two unintended, adverse consequences—inequitable compensation and the cross over effect (Sharkey, 2005). Due to the inequalities associated with caps, some state Supreme Courts have declared them unconstitutional. According to Gfell (2004) and Rallo (2004), the Supreme Courts in Alabama and New Hampshire ruled that caps violate the equal protection clause because they do not adequately compensate injured patients. Patients with mild or moderate injuries may be justly compensated for their non-economic losses. In contrast, patients with more severe injuries may not be fully compensated for their losses due to cap limits. In states with caps, individuals with more severe injuries are undercompensated (Studdert et al., 2004), receiving non-economic awards close to or at the cap amount. Caps may also have a differential, adverse impact on the jury awards and payouts made to certain demographic groups, like the elderly, unemployed, and deceased (Hyman, Black, Silver, & Sage, 2009).

Some state Supreme Courts have declared caps unconstitutional, citing the separation of powers clause and the Seventh Amendment, which guarantees individuals the right to a jury trial in disputes involving more than $20 (U.S. Const. amend. VII). For

example, the Illinois Supreme Court declared caps unconstitutional, claiming that the state legislature was "improperly delegat[ing] to itself the power of remitting verdicts and judgments, which is a power unique to the judiciary (Gfell, 2004, pg. 788). According to the separation of powers clause, the legislative branch, consisting of policymakers, is responsible for drafting, passing, amending, and repealing laws (U.S. Const. art. I, § 8) while the judicial branch is responsible for interpreting and applying the law in the event of disputes between individuals and entities (U.S. Const. art. III, § 1).

According to Sharkey (2005), the cross-over effect is another unintended consequence of non-economic damage caps. To offset the limits placed on non-economic damages, plaintiffs' attorneys may ask for, and patients may be awarded, higher payouts for economic losses, like lost wages. Unconvinced, Hyman et al. (2009) argue that the cross-over effect is not plausible, claiming that patients' award for economic damages would have to increase significantly to offset the loss imposed by caps. If lawyers thought they could ask for, and get, higher economic awards for their clients, they would do so, regardless of whether there is a cap. After all, it is in their best interest—larger awards mean larger contingency fees. To my knowledge, rigorous studies have not investigated whether the cross-over effect exists.

Non-economic damage caps may also limit some injured patients' access to the civil justice system. According to Penchansky and MacNee (1994), many lawyers believe that the severity of patients' injuries affects their probability of success in court and the amount of compensation they receive. Cases involving permanent injuries that impact individuals' functioning or quality of life, such as blindness or paralysis, are more successful in court and often result in larger awards than temporary injuries. These beliefs

affect lawyers' willingness to take cases. Typically, lawyers are unwilling to try obvious cases of malpractice when expected monetary recoveries are less than $200,000. For uncertain cases, they are unwilling to accept cases with expected recoveries under $500,000 (Shepard, 2008). Without access to the civil justice system, injured patients' ability to find out what happened to them and receive just compensation for their injuries is extremely limited.

Even when patients can obtain legal counsel, there is no guarantee that they will receive just compensation for their injuries, given that the adjudication of malpractice lawsuits is associated with many false positive and false negative outcomes (Brennan, Sox, & Burstin, 1996; Studdert et al., 2006). False positive outcomes occur when patients receive compensation but lack compelling evidence that they were indeed injured by a physician's negligent actions or a medical error. Instead, their injuries may have been caused by known side effects of treatment; thus, they should not be compensated. In contrast, false negatives occur when juries fail to award injured patients compensation for their injuries, despite evidence of a medical error. According to Studdert et al. (2006), 73% of malpractice claims with evidence of an error and injury receive compensation while 28% of claims that lack evidence of an error and injury receive compensation. And, the average payment for substantiated claims is $521,560 while the average payment for unsubstantiated claims is $313,205. The fact that juries tend to be made up of lay persons, not physicians or medical experts, may contribute to the false positive and false negative rates.

In the mid-1980s, the United States experienced its third malpractice crisis. Due to poor investment returns, liability insurers raised their premiums to remain solvent,

leading to a "crisis of [insurance] affordability" (Sage, 2004a, pg. 12). Faced with rising premiums, physicians lobbied for tort reform. In response to political pressure from physicians and insurers, many states enacted reforms that were similar to those enacted during the second crisis (Avraham, 2006). However, there were two notable exceptions. According to Siegal, Mello, and Studdert (2008), Florida and Virginia adopted birth-injury compensation programs, which shifted some birth-related injury cases from the courts to a state-administered compensation program. They were designed to compensate families while simultaneously reducing the financial burden placed on insurers, obstetricians, and gynecologists. Data from liability insurers suggests that obstetricians and gynecologists are sued more often than physicians in other practice areas (Studdert et al., 2006; Jena, Seabury, Lakdawalla, & Chandra, 2011; Jena, Chandra, Lakdawalla, & Seabury, 2012). And, due to the nature and severity of some birth injuries, the claims against them may result in large indemnity payments (Jena et al., 2011). Taken together, these factors may be contributing to higher premiums for obstetricians.

Earlier the impact of industrialization was discussed; however, recognition of the industrialization of medicine and its implications was late as compared to other professions (Perrow, 2011; Perrow & Guillen, 1990). At the dawn of the twenty-first century, the Institute of Medicine's (2000) publication of *To Err Is Human* drew national attention to the plethora of preventable, system-level errors occurring in hospitals nationwide. These errors are contributing to the premature death and injury of thousands of patients annually. And, injured patients may need additional treatment or require an extended hospital stay, which increases the nation's health care expenditures. Despite their human and financial toll, many of these errors were going undetected and

unacknowledged by medical professionals. They are not unique in that they often do not investigate the root cause of these errors (Short & Clarke, 1992; Tenner, 1996; Reason, 1997; Vaughan, 1997; Casey, 1998; Perrow, 2011) and even blame unfortunate events on their patients' underlying pathology or psychosis (Millman, 1977). Hence, some do not learn from their mistakes, implement policies to prevent similar occurrences in the future, or compensate injured patients.

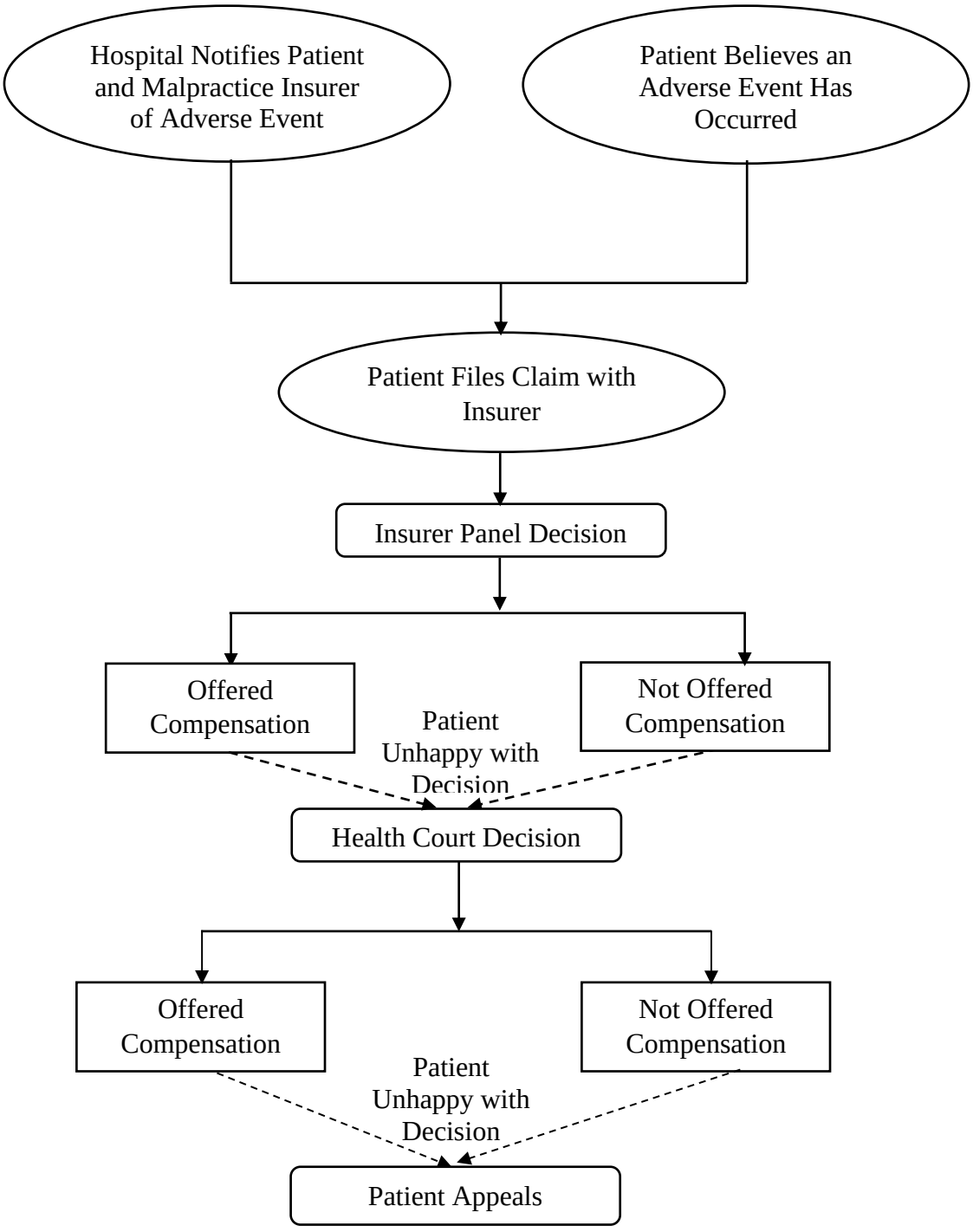
In contrast, when sued for malpractice, medical professionals and health care organizations can examine the root cause of injuries and deaths. The information uncovered during discovery provides health care organizations with a wealth of valuable information on the events in question. Receptive organizations can study this information, learn from their mistakes, and take steps to prevent similar events from occurring in the future (Schwartz, 2015).

The Institute of Medicine's (2000) report sparked policymakers' interest in initiatives aimed at reducing the incidence of preventable, medical errors and compensating injured patients. To accomplish these goals, numerous alternatives to traditional tort reforms[4] have been proposed. Mello and Kachalia (2010) have proposed creating a tiered schedule of non-economic damages. A mutually exclusive, harm severity hierarchy would be created and used to classify the extent of patients' injuries. And, each category would be associated with a range of possible compensation values so that patients that fall within a specific category could only be awarded between X and Y dollars. In theory, having a tiered system would promote both horizontal and vertical

[4] In the context of medical malpractice, tort reform refers to any policy that effects patients' access to the civil justice system or ability to receive compensation for the injuries, such as statutes of limitation, caps on non-economic damages, and joint-and-several liability laws.

equity. Patients with more severe injuries would receive more compensation than those with less severe injuries (i.e. vertical equity). Meanwhile, patients with similar injuries would receive similar, but not necessarily identical, levels of compensation (i.e. horizontal equity). To date, no state has adopted a tiered fee schedule, although the Washington State Legislature has considered it (Washington State Legislative Task Force on Noneconomic Damages, 2005).

Researchers and patient safety advocates also have proposed establishing an administrative health court system. However, there is some inter-proposal variation in how the system would be structured (Mello, Studdert, Kachalia, & Brennan, 2006; Mehlman & Nance, 2007; Peters, 2008; Mello & Kachalia, 2010). According to Mello et al. (2006), administrative health courts have five distinguishing features. First, a specially trained judge is responsible for reviewing cases and awarding compensation, if applicable. Second, to obtain compensation, injured patients must demonstrate avoidability, the notion that the injury they sustained could have been avoided if their providers had adhered to the standard of care or implemented appropriate safety protocols. Third, if patients successfully demonstrate avoidability, then they are entitled to compensation that is proportional to the preventability of the harm they sustained. Fourth, the prior decisions made by health court judges are considered legal precedent and should be considered in future cases involving similar injuries. Lastly, injured patients who sustain economic losses, like lost wages, due to their injury would be compensated in full for them. However, compensation for their non-economic losses, like pain, suffering, and loss of consortium, would be based on injury severity.



Adapted from Mello et al. (2006)

Figure 1: The Health Court Adjudication Process

Figure 1 demonstrates how the health court system proposed by Mello et al. (2006) would be set-up and process claims. Following an adverse event, the health system, or provider, is required to inform both their patients and their malpractice insurers of its occurrence. After being informed, patients would have the option of filing a claim with their providers' insurer and seeking legal representation, if desired. Insurers, in conjunction with providers, would review what happened and determine whether the avoidability standard has been met. If so, then they are required to compensate patients for their economic and non-economic losses. Otherwise, they should explain to patients why their claim has been denied. Patients can appeal the insurers' decision and ask the health court to review their claim. If they are unhappy with the court's decision, they can appeal to a judicial tribunal and appellate court. To date, no state has adopted an administrative health court system, although some have considered it (Tobias, 2005).

Some lawyers and legal scholars are concerned about the implementation of an administrative health court system, claiming that such a system could violate patients' constitutional right to a jury trial under the Seventh Amendment (Mehlman & Nance, 2007; Elliott, Narayan, & Nasmith, 2008; Widman & Hochberg, 2008). Currently, jurors are tasked with determining whether physicians are responsible for patients' injuries. If they believe that physicians are responsible, then they are tasked with determining how much compensation patients should receive for their economic and non-economic losses. Under the proposed system, a judge, not a jury, would be responsible for determining whether patients have been injured and are entitled to compensation.

Historically, according to Widman and Hochberg (2008), the judiciary has only allowed Congress to rescind individuals' right to a jury trial if a sufficient *quid pro quo* is

offered. Basically, injured individuals must be guaranteed compensation for their injuries, regardless of who is at fault. For example, workers' compensation cases are decided by a judge, not a jury, because all workers injured on the job are entitled to compensation, regardless of whether they or their employers are at fault. Under the proposed health court system, injured patients are not offered a sufficient *quid pro quo* because they would only be compensated if a judge believes their claim meets the avoidability standard. To date, the Supreme Court has not had the opportunity to determine whether health courts are constitutional. Before it can adjudicate this issue, Congress would need to enact health court legislation and injured patients would have to file a lawsuit, claiming that their right to a jury trial has been revoked.

In lieu of a national, administrative health court system, some health systems have explored the possibility of implementing, or have implemented, error disclosure and compensation programs (Kraman & Hamm, 1999; Helmchen, 2008; Boothman et al., 2009), which mimic the first few steps in the health court process. In 2001, the University of Michigan Health System (UMHS) implemented a disclosure-with-offer program. When medical errors occur, risk management personnel and physicians are proactive, investigating what factors contributed to the incident, so they can learn from their mistakes. Afterwards, they disclose what happened to patients and their families, and, if needed, patients are offered follow-up care and compensation. However, if an internal "investigation concludes that medical staff did all that they could [to prevent what happened] the system will stand behind its employees," defending them from frivolous malpractice claims (Alexander, 2014, pg. 1).

After implementation of its disclosure and compensation program, the UMHS experienced a decrease in its malpractice burden. The average monthly rate of malpractice lawsuits brought against the system decreased from 2.13 per 100,000 patient encounters to 0.75 per 100,000 patient encounters (Kachalia et al., 2010). This decrease suggests that risk managers are promptly disclosing errors, negotiating settlement offers with patients, and implementing patient safety initiatives to avoid similar errors in the future. Once risk managers and patients reach a settlement, the decision is considered binding and patients are prohibited from filing a lawsuit. If they are unable to reach a settlement, then patients can file a lawsuit.

However, it is possible that some of the patients who prefer litigation to a settlement will not receive any compensation. Physicians win most lawsuits with non-existent to weak evidence of negligence or error as well as many with strong evidence of negligence or error, suggesting that lay juries have a pro-defendant (i.e. physician) bias (Peters, 2009). Even when cases are decided in patients' favor, they may not receive all the money they are awarded. This is due, in part, to the compensation limits imposed by defendants' liability insurance (Hyman, Black, Zeiler, Silver, & Sage, 2007).

While the UMHS's disclosure and offer program has reduced malpractice litigation (Kachalia et al., 2010), its widespread adoption may be limited, depending on whether health systems are self-insured. Currently, the health systems that have adopted these types of programs are self-insured, so they insure all their employees and are responsible for paying all malpractice-related expenses that arise (Berlin, 2006). When patients successfully sue for malpractice, the health system, not the physicians who treated them, are responsible for paying the jury award and reporting details of the

lawsuit to the National Practitioner Data Bank (NPDB) (Kass & Rose, 2016), a federal repository that contains information on malpractice settlements and successful lawsuits against a variety of health care professionals, including physicians (Waters et al., 2003). When malpractice lawsuits involve physicians that work for a self-insured system, the organization, not physicians, is reported to the NPDB. Since this protects physicians from reputational harm and professional sanctions, they should be more willing to disclose medical errors and adverse events to patients and/or their families than those who work for a health system that is not self-insured (Kass & Rose, 2016).

To assuage physicians' malpractice fears, some state legislatures have passed apology and/or disclosure laws, hoping they will prompt physicians to engage in the honest, timely disclosure of medical errors and adverse events. In April of 2003, the Colorado state legislature enacted the nation's first apology law, making both expressions of sympathy and admissions of fault, such as I'm sorry I injured you while performing surgery on your lower back, made following an unexpected medical error or adverse event inadmissible in court (Cohen, 2004). Since then, other states have enacted apology laws. However, they only protect expressions of sympathy, such as I'm sorry you were hurt during surgery, not expressions of fault, which could be introduced as evidence of malpractice (Mastroianni, Mello, Sommer, Hardy, & Gallagher, 2010). Apology laws do not protect what some ethicists consider a true apology, namely an acknowledgement that the apologizer violated social norms or did not live up to our expectations, is responsible for what happened, and is genuinely sorry for what happened (Robbennolt, 2003).

In contrast, according to Mastroianni et al. (2010), in states with mandatory disclosure laws, health systems are required to inform patients of unanticipated health

outcomes. For instance, during surgery, your lower back was injured. Overall, these laws are largely silent on admissions of fault, suggesting that they could be admissible in court. As of June 2010, 34 states have apology laws, 9 have disclosure laws, and 6 states have both types of laws (see Table 2). The remaining states do not have either law. There is also significant interstate variation in who is protected by these laws (e.g. health systems vs. physicians), the types of events protected (e.g. medical error, adverse event, negligence, etc.), and the forms of communication that are protected (e.g. written, oral, or both).

The limited scope of states' apology and disclosure laws neither reduces physicians' malpractice risk nor meets patients' emotional or informational needs. Following unanticipated health outcomes, many patients want an apology, an explanation of what happened to them, and a promise that steps will be taken to prevent similar occurrences in the future. Denied this, they may sue for malpractice (Hickson, Clayton, Githens, & Sloan, 1992; Vincent, Pincus, & Scurr, 1993; Vincent, Phillips, & Young, 1994; Witman, Park, & Hardin, 1996; Wu, 1999; Schwappach & Koeck, 2004). And, even when offered an apology and explanation of what happened, some injured patients still opt to sue for malpractice (Witman et al., 1996; Mazor et al., 2004; Hobgood, Tamayo-Sarver, Elms, & Weiner, 2005a).

Table 2: Apology and Disclosure Laws by State

Apology Law		Disclosure Law	Both Laws	Neither Law
Arizona	Montana	Nevada	California	Alabama
Colorado	Nebraska	New Jersey	Florida	Alaska
Connecticut	New Hampshire	Pennsylvania	Oregon	Arkansas
Delaware	North Carolina		Tennessee	Illinois
Georgia	North Dakota		Vermont	Kansas
Hawaii	Ohio		Washington	Kentucky
Idaho	Oklahoma			Michigan
Indiana	South Carolina			Minnesota
Iowa	South Dakota			Mississippi
Louisiana	Texas			New Mexico
Maine	Utah			New York
Maryland	Virginia			Rhode Island
Massachusetts	West Virginia			Wisconsin
Missouri	Wyoming			

Source: Mastroianni et al. (2010).

Even if apology and disclosure laws afforded physicians greater legal protections, it still might not assuage their malpractice fears. The medical community is plagued by a persistent, pervasive fear of being sued for malpractice with many physicians significantly overestimate their probability of being sued (Lawthers et al., 1992), possibly due to errors in risk perception. According to Kahneman's (2011) availability heuristic, individuals are apt to overestimate the probability of rare events occurring, like being struck by lightning, if they can easily recall instances of the events in question. Considering this, the frequent discussions of malpractice-related issues by the mass media and amongst policymakers and physicians may be contributing to physicians' irrational fear of being sued.

Physicians' fear of being sued, or their prior involvement in a malpractice lawsuit, may prompt them to change the way they practice medicine (Hershey, 1972; Charles, Pyskoty, & Nelson, 1988; Localio et al., 1993; Harris Interactive Inc., 2002), a practice known as defensive medicine. According to Studdert et al. (2005), there are two types of

defensive medicine—positive and negative. Positive defensive medicine occurs when physicians provide more care than medically necessary to avoid a malpractice lawsuit. For instance, they may order additional diagnostic tests to confirm their diagnosis, even though their initial testing provided evidence to support their original diagnosis. In contrast, negative defensive medicine occurs when physicians limit the scope of their practice to reduce their risk of being sued. For instance, they might stop performing certain procedures, such as spinal taps, and stop seeing certain types of patients, such as those receiving medical assistance or workers' compensation.

While practicing defensive medicine seems like a rational response to the fear of being sued, there is some debate over whether it truly exists, given mixed research findings (Sloan & Shadle, 2009). If it indeed exists, then it is having a significant impact on health care expenditures. According to Weinstein (2008), the United States spent between $100 billion and $178 billion dollars on defensive medicine in 2005. The bulk of these expenditures would probably be borne by health insurers and their enrollees or self-insured employers and their employees in the form of higher premiums, deductibles, and copayments. And, since medical care is not risk free, exposing patients to unnecessary tests and procedures could have an adverse impact on their health and well-being.

Given the current medicolegal environment, the success of the proposed health court and medical error disclosure and compensation systems is somewhat dependent on physicians' willingness to openly and honestly disclose medical errors and adverse events to patients and/or their families in a timely manner. A structured literature review conducted by Kaldjian, Jones, and Rosenthal (2006) indicates that numerous factors may influence physicians' willingness to disclose, including their fear of being sued for

malpractice and their workplace's policies and procedures. Since physicians in different practice areas are concerned about being sued for malpractice and report practicing defensive medicine (Studdert et al., 2005; Nahed, Babu, Smith, & Heary, 2012; Sethi, Obremskey, Natividad, Mir, & Jahangir, 2012; Ramella, Mandoliti, Trodella, & D'Angelillo, 2015; Reisch et al., 2015), physicians' willingness to disclose may be affected by their malpractice concerns, especially their beliefs about the relationship between disclosure and malpractice risk.

Purpose of Study

This dissertation examines whether apparentness and harm severity affect physicians' willingness to disclose medical errors or adverse events to patients and/or their families. I hypothesize that those 2 factors will influence their willingness to disclose, given the physician community's preoccupation with malpractice risk. I tested the following hypotheses:

- *Hypothesis #1:* Physicians will refrain from disclosing medical errors that do not harm patients.
    - *Rationale 1:* Physicians have a very demanding workload, so taking time out of their busy schedules to disclose errors that are not harmful would not be an efficient use of their time. Furthermore, telling patients about unharmful errors could cause them undue stress and anxiety, raising concerns about the *primum non nocere* (i.e. first, do no harm) principle that governs medical practice.

- *Hypothesis #2:* Physicians' beliefs regarding the relationship between disclosure and malpractice risk will influence their willingness to disclose harmful medical errors.
    - *Rationale 2a:* If physicians believe that disclosing harmful errors increases their malpractice risk, then they will be reluctant to engage in disclosure. They would not want to risk doing or saying something that patients and/or their families could use as evidence against them in court (Bell et al., 2012). Physicians' concerns are warranted, given that many lawsuits involve harmful medical errors (Wallace et al., 2013).
    - *Rationale 2b:* If physicians believe that disclosing harmful errors decreases their malpractice risk, then they will be apt to engage in disclosure, considering it as in their best interest. By engaging in disclosure, they could potentially avoid the psychological and physiological distress that is often associated with malpractice litigation (Charles et al., 1988; Charles, 2001).
- *Hypothesis #3:* Compared to less apparent errors, physicians will be more apt to disclose more apparent errors.
    - *Rational #3:* If errors are readily apparent to patients and/or their families, then they will probably ask their providers about them. If physicians evade their questions or provided vague, unsatisfactory answers, patients and/or their families may become upset and file a lawsuit, viewing it as the only way to find out what really happened.

Thus, it is in physicians' best interest to truthfully disclose what happened.

- *Hypothesis #4:* Physicians will disclose adverse events to patients and/or their families, regardless of harm severity.
    - *Rationale #4:* Adverse events are harmful and have a known, statistical probability of occurring. While physicians do not know *a priori* which patients will experience a specific adverse event, they should have a rough estimate of the likelihood a given adverse event will occur. For example, if they regularly prescribe oral contraceptives, then they should know that X% of women on the pill will develop a potentially fatal blood clot. Since adverse events are an inherent part of therapeutic interventions, and not the result of providers' knowledge or skill level, they should be apt to disclose them. They are not at fault for what happens to patients.
- *Hypothesis #5:* Physicians' willingness to disclose medical errors may or may not be influenced by how readily apparent they are to patients and/or their families.
    - *Rationale #5.* If medical errors are readily apparent, then patients or their families may ask questions about what happened and sue for malpractice when an explanation is not forthcoming. If physicians are concerned about their malpractice risk, they may be less apt to disclose what happened out of fear that patients or their families will misconstrue what they said, interpret it as an admission of legal

liability, and sue them. Alternatively, if physicians believe that disclosure will reduce their malpractice risk, then they will be apt to disclose readily apparent medical errors.

- *Hypothesis #6:* Physicians' willingness to disclose adverse events will not be influenced by how readily apparent they are to patients and/or their families.
    - *Rationale #6:* Since adverse events are a known, expected part of medical care that is beyond physicians' immediate control, they cannot, and should not, be held legally responsible for them. Thus, their liability concerns, or lack thereof, should not influence their willingness to disclose adverse events, regardless of how readily apparent they are to patients and/or their families.

Chapter II: Conceptual Model

Defining Negligent Events, Adverse Events, and Medical Errors

Central to this work is the ability to distinguish between the following five concepts: negligence, negligent adverse events, adverse events, preventable adverse events, and medical errors. Figure 2 provides a visual representation of the relationship between each of these concepts, and the remainder of this section discusses each of them in turn.

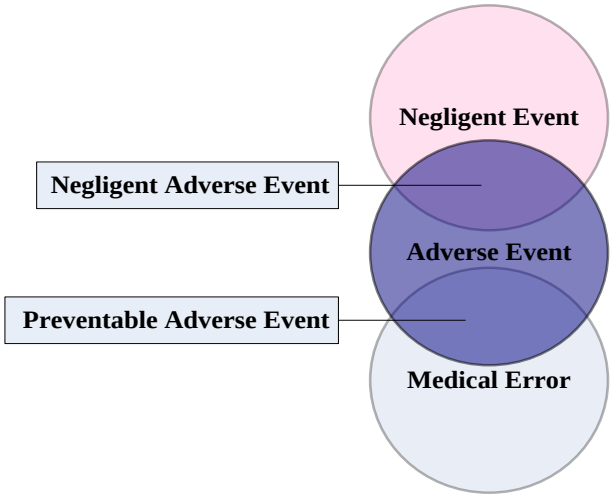


Figure 2: Relationship Between Negligent Events, Adverse Events, and Medical Errors

Medical negligence occurs when physicians fail to abide by the standard of care reasonably expected of them, given their training, expertise, and practice area (Kapp, 1996; Oyebode, 2006; Sohn, 2013). Basically, it is the provision of substandard medical care. For example, physicians would be negligent if they prescribed penicillin to children with ear infections without first checking their medical records for known drug allergies.

Of the five concepts, negligent adverse events are the most complex because other issues beside practice come into play—most notably the law. At a fundamental level, negligent adverse events occur when patients are harmed by medical negligence (Grober & Bohnen, 2005). For example, during a vaginal delivery, a woman develops umbilical

cord prolapse, which occurs when the cord becomes compressed, reducing the amount of oxygen reaching the baby (American Pregnancy Association, 2015). The obstetrician overseeing the birth notices the prolapse but does not do anything to address it. As a result, the child is born with severe brain damage. The obstetrician failed to properly address the prolapse, despite the known consequences of cord prolapse and the availability of viable treatment options. In such instances, the obstetrician should have performed a Cesarean section (American Pregnancy Association, 2015).

According to the American Board of Professional Liability Attorneys (2017), medical negligence becomes medical malpractice when three conditions are met. First, the plaintiff must demonstrate that physicians were negligent. If a standard of care does not exist, then they must demonstrate that the care provided was unreasonable, or not what "reasonably prudent health care professionals [would do] under like or similar circumstances" (pg. 1). Second, attorneys must demonstrate that physicians' actions harmed patients in some way. If patients were harmed, but the standard of care was followed, then their injuries were not caused by negligence. Lastly, attorneys must demonstrate that patients sustained significant personal (e.g. disability) or economic (e.g. lost wages) damage due to their injuries. If patients cannot clearly demonstrate that they were under the alleged physicians' care when the negligent acts occurred and that these actions harmed them, then they probably will not be successful in court (Smith, 1941; Harrison et al., 1985).

Typically, malpractice cases are adjudicated in civil court; however, in rare instances, they may be adjudicated in criminal court (Steinman 2008; Bryden & Storey, 2011). In civil proceedings, juries are responsible for determining whether physicians

have engaged in malpractice. And, if so, how much compensation to award injured patients. In contrast, with criminal proceedings, juries must determine whether physicians' actions rise to the level of criminal, or gross, negligence, which is often punished with time in prison under state law.[5] According to Fleury (2013), physicians may be found criminally negligent if they practice without the proper credentials (e.g. without a license), do not respond to emergencies in a timely manner, practice while under the influence of drugs and/or alcohol, and/or engage in any other behaviors that demonstrate a "willful disregard to human life or depraved indifference to human life" (pg. 2). For instance, a jury found Dr. David Benjamin guilty of second-degree murder and sentenced him to 25 years to life in prison after he perforated the uterus and lacerated the cervix of a pregnant woman during an illegal, outpatient abortion. Due to her injuries, she experienced heavy bleeding, which Dr. Benjamin did not address in a timely manner. Instead, he left her to bleed out and die unattended while he performed another abortion (Steinman, 2008).

Adverse events are an unavoidable part of medical care. They occur when patients are injured by medical management, not their current health status or the presence of multiple comorbidities (Sohn, 2013). Adverse events can be thought of as the side effects of diagnostic and therapeutic interventions, like the changes in appetite and weight experienced by patients taking anti-depressants. While treatment side effects have a known probability of occurring, physicians do not know *a priori* whether a specific

[5] Typically, the federal government is responsible for investigating and prosecuting alleged crimes related to the powers granted to it under the United States Constitution and expanded over time through federal judicial court rulings (Justia, 2018). For example, human trafficking is often considered a federal crime since individuals are often transported across state lines. Since the Constitution's Commerce Clause allows the federal government to regulate interstate commerce, it can make laws prohibiting human trafficking and investigate and prosecute those suspected of sex trafficking.

patient will experience them. For instance, physicians who regularly prescribe oral contraceptives should know that the use of combination pills is associated with an increased risk (adjusted odds ratio 2.97, 95% confidence interval 2.78 to 3.17) of developing a potentially life-threatening blood clot (Vinogradova, Coupland, & Hippisley-Cox, 2015).

The final core concept is that medical errors are an unfortunate, routine part of medical care, "given its inherent uncertainty and complexity and the need to make decisions despite limited information" (Wu, Folkman, McPhee, & Lo, 2003, pg. 226). They are mistakes caused by human fallibility, system fallibility, or the dynamic interaction between them (Reason, 1990; Casey, 1998; Zhang, Patel, Johnson, & Shortliffe, 2004; Perrow, 2011; Sohn, 2013; Smorti, Cappelli, Zarantonello, Tani, & Gensini, 2014). Human errors occur because all individuals are prone to making mistakes (see Table 3). Physicians, and other providers, may make mistakes because they are tired, stressed, overworked, inexperienced, or distracted (Ulanimo, O'Leary-Kelley, & Connolly, 2007; Kronman, Paasche-Orlow, & Orlander, 2011; Bari, Khan, & Rathore, 2016). They are also apt to make mistakes when treating patients presenting with atypical symptoms or multiple comorbidities (Hobgood, Hevia, Tamayo-Sarver, Weiner, & Riviello, 2005b).

Table 3: Medical Errors Classified by Genesis

Genesis	Definition
Human Errors	Mistakes caused by physicians' innate fallibility (e.g. inattentiveness, lack of medical knowledge, lack of technical skills, or a combination of these factors)
System Errors	Specifying system errors is quite complex, given the variability in how systems are designed. However, models of system errors are usually reduced to two core concepts*: • Interactions (linear → complex) • Coupling (loose → tight)

*Source: Perrow (2011)

According to the Institute of Medicine (2000), "*a system is a set of interdependent elements interacting to achieve a common aim. The elements may be both human and non-human (e.g. equipment, technologies)* [italics in original]" (pg. 52). A hospital is an organizational system composed of many subsystems—like the emergency department, intensive care unit, obstetrics ward, and pharmacy—that work together to improve patients' health and well-being. Each of a hospital's subsystems is composed of numerous, interdependent elements. For instance, pharmacists, pharmaceutical products, telephones, computers, machines programmed to dispense pre-specified doses of a particular drug, and even the shelves lined with bottles, jars, and tubes are just a few of the elements that make up a pharmacy.

Based on Perrow's (2011) typology, the design of systems can be classified by their degree of interaction and coupling (see Figure 3). A system's level of interaction can be arrayed on a continuum from linear to complex. In linear systems, a prespecified, expected sequence of events should occur regularly and predictably. As such, when unexpected or unplanned events occur, there effects are often readily apparent because the system can no longer function as originally intended. An assembly line is an example of a linear system.

In complex systems, there is not a prespecified, expected sequence of events. The elements within the system regularly interact with each other—often in highly unpredictable ways. Given the sheer number of interactions taking place, mistakes and errors that occur may not be readily apparent, although their effects may be. Hospitals are highly complex systems. In the process of exploring possible diagnoses, physicians might refer patients to the radiology department for imaging and to laboratory services for blood tests. Once diagnoses are declared, they often must rely on pharmacists to dispense the drugs their patients need. Since numerous individuals are responsible for any given patient's health, unexpected events may occur. For instance, due to incorrect dispensing by the pharmacist, a patient might receive the wrong drug, a mistake that might not be discovered until the patient has a severe, adverse reaction to it.

According to Perrow (2011), coupling refers to the extent to which the different elements within a system or subsystem are dependent on one another. It can be arrayed on a continuum from loosely to tightly. In tightly coupled systems, what happens to one component of the system directly affects one, or more, of the system's other components. Tightly coupled systems are like a row of dominoes. If one domino falls over, then so do the rest of them. The assembly line in a manufacturing plant is a tightly coupled system. If one worker runs out of the raw materials needed to build their portion of a widget, then the assembly line must be shut down until the plant can get more raw materials. As a result of this disruption in the production process, widget purchasers might not receive their orders on time.

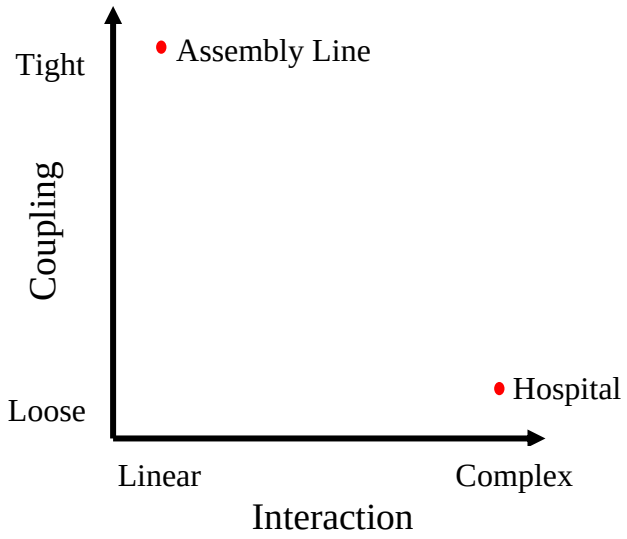


Figure 3: Perrow's (2011) System Typology

In contrast, in loosely coupled systems, the systems' components are not as reliant on one another as they are in tightly coupled systems. However, they still regularly interact with each other. Since the different components are not very reliant on each another, the individuals working within the system are better equipped to handle and respond to unexpected events, like delays and employee absenteeism. For instance, when a nurse on a hospital's obstetrics ward calls in sick, the maternity ward does not shut down. Instead, an attempt is made to find an off-duty nurse willing to come into work on short notice. If no one is available, then the other nurses on the ward will have to pick up the slack. Meanwhile, the other subsystems within the hospital are unaffected by the nurse's absence and able to carry on with business as usual.

System errors are mistakes caused by unintended or unseen flaws in the design of a system that trigger a chain of events that can produce unexpected, dangerous, or catastrophic results. Many people are familiar with system errors, like those associated with the Space Shuttle Challenger disaster (Vaughan, 1997) and Bhopal disaster (Weir,

1987). While system errors in healthcare may not receive as much attention as the two aforementioned disasters, they are commonplace. For example, distracted by the chaos going on around him, a physician accidently prescribes 100 units of insulin, instead of 10 units. Unbeknownst to the physician, an overnight update of the computerized order entry system has disabled the pop-up warning message that lets physicians know that the dosage they entered lies outside of the typically therapeutic range. As a result, the physician does not realize his mistake. The pharmacist, not realizing that the computerized system has malfunctioned, pulls up the prescription and fills it without questioning the unusually large dosage. Later that day, a nurse administers the dosage. And, due to an insulin overdose, the patient falls into a coma. In this instance, a linear, tightly coupled system's process triggered an unfortunate chain of events.

Since mistakes are apt to occur in highly complex systems, hospitals and health systems cannot eliminate all medical errors (Perrow, 2011). However, they can reduce their chances of occurring by implementing numerous institutional precautions and safeguards aimed at preventing an unfortunate chain of events (Roberts, 1989). For instance, to reduce drug interactions and allergic reactions, hospitals could implement computerized pharmacy systems that scan patients' medical records for allergies and contraindications and only dispense drugs when none are present. Afterwards, the pharmacist could double check patients' medical records to ensure there are no known drug allergies or contraindications. And, lastly, when patients come to pick up their prescriptions, the pharmacist could ask them if they have any known drug allergies, just in case their medical record is incomplete or inaccurate. This is an example of a tightly coupled system.

Reason's (1990, 1997) model is a more recent model of organizational error that has been widely used in health services research. The hallmark of Reason's (1990, 1997) model is a rather simple analogy using Swiss cheese; hence, the referral to his model as the Swiss cheese model. This model postulates that mistakes will happen. However, if organizations implement the appropriate safeguards, then they can reduce, but not eliminate, the likelihood of errors occurring. Mistakes can still occur in systems that have implemented multiple safeguards (see Figure 4). In the model, each slice of Swiss cheese represents a safeguard that a system has implemented to prevent errors. In each slice, the holes represent the opportunities for errors to occur. When the holes in the slices are aligned, then an error, or series of errors, can occur (i.e. red arrows). For instance, if an automated drug dispensing system is not functioning properly, then it may not dispense the correct drug or dosage. And, if the pharmacist forgets to double-check the prescription because they are distracted, then the patient might receive the wrong medication, which could adversely impact their health. In contrast, if the holes are not aligned, then errors should not occur (i.e. green arrows).

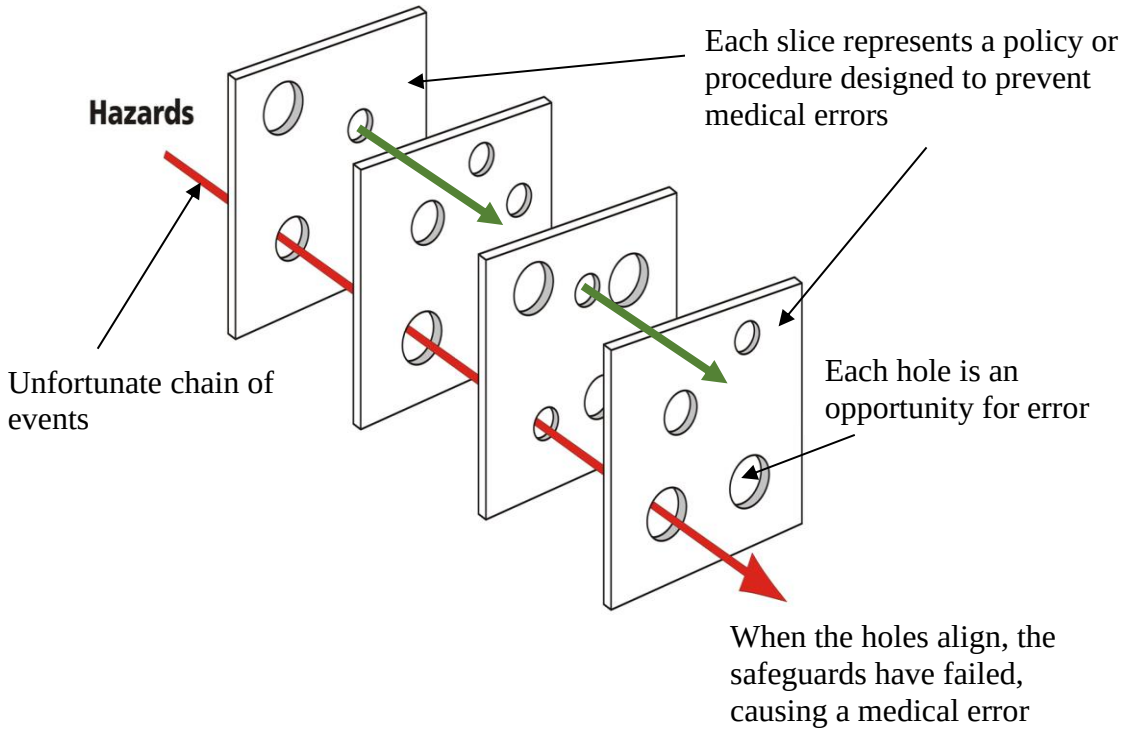


Figure 4: The Swiss Cheese Model of Error Prevention

Reason's (1990, 1997) model has gained widespread usage, which is due in part to the usefulness of the analogy. But, as is often the case when an analogy is used, the substance of the model is reduced. In this case, the operation of a complex system and its multiple safeguards has been reduced to 'slices' and 'holes.'

Within the research on medical errors, a fundamental classification of errors has emerged which aggregates them into one of three classes: preventative care, diagnostic, or treatment errors (see Table 4) (Elder & Dovey, 2002; Dovey et al., 2002; Oyebode, 2006). Preventative care errors occur in the process of providing preventative health services. Physicians would be committing a preventative care error if they did not offer a flu shot to a 55-year-old man with diabetes and asthma who is not currently vaccinated.

Diagnostic errors occur in the process of investigating possible diagnoses and declaring an official diagnosis (Dovey et al., 2002; Elders & Dovey, 2002; Schiff et al., 2009). In primary care, they are apt to occur when patients present with atypical symptoms, non-specific symptoms, and/or multiple comorbidities (Kostopoulou, Delaney, & Munro, 2008). For instance, there are known sex differences in the risk factors for heart disease. Despite this, the risk factors for and signs of heart disease in men are often used to diagnose heart disease in women (Harvard Health Publishing, 2017). Due to this, women may not receive the appropriate diagnosis or receive additional diagnostic testing for heart disease. Prior research suggests men with suspected coronary artery disease are more apt to receive additional diagnostic testing than women with suspected coronary artery disease (Shaw et al., 1994). In the intersection of law and medicine, there is substantial overlap between diagnostic error and medical malpractice cases. Many medical malpractice lawsuits involve diagnostic procedures (Wallace, Lowry, Smith, & Fahey, 2013).

Treatment errors occur in the process of treating patients for existing conditions (Elder & Dovey, 2002; Dovey et al., 2002; Graber, Franklin, & Gordon, 2005; Oyebode, 2006). Examples of treatment errors include performing surgery on the wrong limb, prescribing the wrong medication, and prescribing the right medication, but administering the incorrect dosage. When medical errors harm patients, they are considered preventable adverse events (Elder & Dovey, 2002; Grober & Bohnen, 2005).

Table 4: Typology of Medical Errors

Preventative Care	Diagnostic	Therapeutic
Providing inappropriate care	Ordering the wrong test	Administering the wrong treatment
Delaying needed care	Declaring the wrong diagnosis	Delaying needed treatment
Failing to provide needed care	Delaying a diagnosis	Failing to provide needed treatment
	Failing to follow-up on test results or lab work	

Sources: Dovey et al. (2002); Elders & Dovey (2002); Schiff et al. (2009); Graber, Franklin, & Gordon (2005); Oyebode (2006)

Within the research on treatment errors, there is a special case known as the near miss, which occurs when errors are caught and corrected before they reach patients (Chamberlain, Koniaris, Wu, & Pawlik, 2012; Agency for Healthcare Research and Quality, 2018). For instance, consider a middle-aged man who is admitted to the hospital and placed in a shared room with an elderly man. A nurse enters the room to give the older patient his medications. However, since some of the unit's other nurses called in sick, she is overworked and distracted by all the things she must do. As a result, she inadvertently gives the medication to the younger patient. Fortunately, he realizes that the medications he received are not his and presses the call button to alert the nurse. The nurse retrieves the medication and gives it to the correct patient (Agency for Healthcare Research and Quality, 2018).

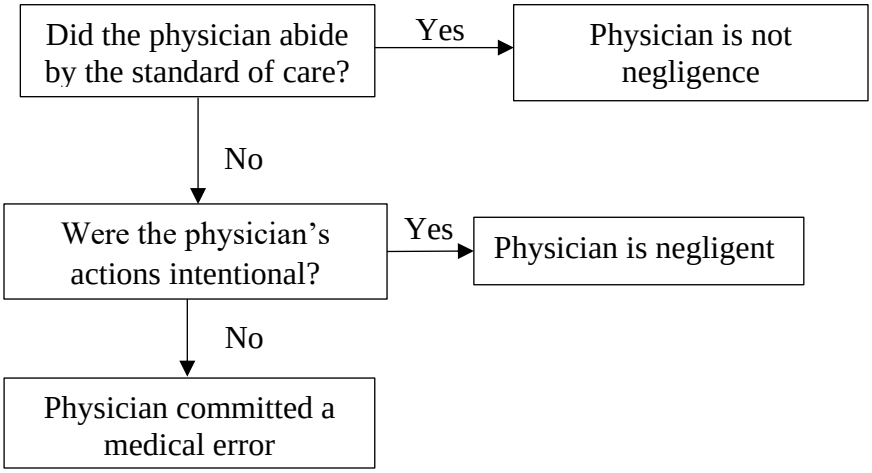


Figure 5: The Role of Physician Intent in Medical Negligence and Error

To ensure conceptual clarity, a clear distinction must be drawn between medical negligence and medical error (see Figure 5). According to Sohn (2013), the dividing line is physicians' motives and intentions. If physicians abide by the standard of care, then they are not negligent, regardless of the impact their actions have on patients' health outcomes. However, if they do not follow the standard of care, then their motives must be examined. If they intentionally choose not to abide by it, then they are negligent, regardless of the outcome. Since physicians are making a conscious choice, regulatory bodies, like state licensure boards, can use incentives and sanctions to deter them from practicing negligently. When they fail to abide by the standard of care and their actions are not intentional, then an error has occurred. With medical errors, physicians do not intend to make mistakes; they happen because people are fallible. Thus, there is only so much that can be done to prevent them. In practice, it may be quite difficult to distinguish negligence from a medical error, given that only physicians know their true motives. To some extent, regulatory authorities may be able to deduce health care providers' true motives by identifying patterns in their practice behaviors and patient outcomes. Using

this method, regulatory agencies have been able to identify providers with malicious intent, like nurse Ben Geen who gave patients at Horton General Hospital in the United Kingdom potentially lethal doses of drugs to induce cardiac arrest, so he could play God and resuscitate them (FirstLook TV, 2016).

Assessing Harm Duration and Severity

In the preceding section, we covered the items included in the black box on the left-hand side of Figure 6 to provide some background context. Now, we will move onto what is being studied as part of this research—the relationship between harm, apparentness, and the disclosure of medical errors and adverse events to patients and their families.

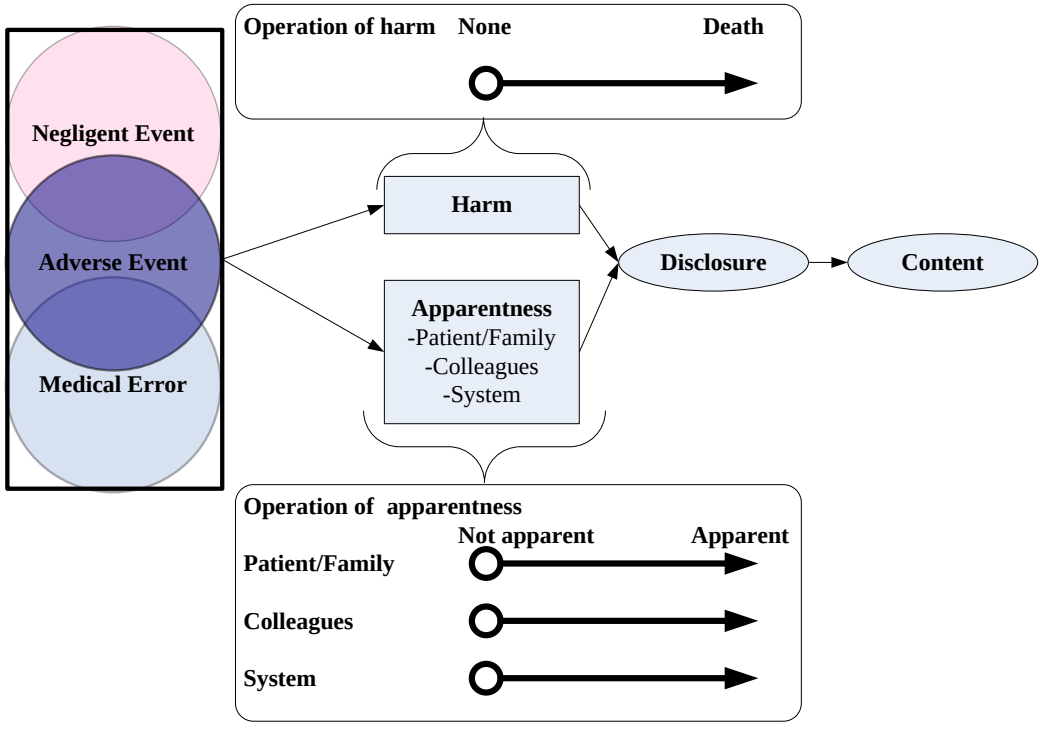


Figure 6: The Relationship Between Harm, Apparentness, and Disclosure

According to a *White Paper* produced by the American Society for Healthcare Risk Management (ASHRM) (2014), the magnitude of medical errors can be determined by examining their duration and the severity of the harm, if any, that patients sustain because of them (see Table 5). Harm duration is classified as unknown, temporary (less than a year), or permanent (a year or more). Harm severity is classified as unknown, no harm, mild harm, moderate harm, severe harm, and death. The harm that patients sustain can be emotional, psychological, physical, or some combination of these. Patients sustain mild harm when they temporarily become symptomatic or experience a temporary loss of functioning that resolves on its own or with additional treatment. For example, a patient develops a maculopapular rash after being given a drug they are known to be allergic to. Upon noticing the rash, their provider switches them to a different medication and treats the rash, resulting in the patient making a full recovery. Patients sustain moderate harm when their injuries have an adverse impact on their functional status and/or quality of life. For instance, developing ototoxicity (i.e. hearing loss and balance difficulties) after being prescribed Gentamicin for an infection. Patients sustain severe harm when their injuries have a significant adverse impact on their functional status and/or quality of life. For instance, failing to accurately diagnosis a male patient's prostate cancer until it has become metastatic to the lymph nodes and bones.

Table 5: The American Society for Healthcare Risk Management's Classification of Harm by Duration and Severity

Scale	Description
Harm Severity Scale	
Unknown	
None	While a medical error occurred, there is not any evidence that it harmed the patient.
Mild	Due to a medical error, the patient temporarily becomes symptomatic and/or experiences a loss of functioning that resolves on its own or with additional treatment.
Moderate	Due to a medical error, the patient's functional status and/or quality of life is adversely affected.
Severe	Due to a medical error, the patient experiences a significant decrease in their functional status and/or quality of life.
Death	Due to a medical error, the patient is no longer alive.
Harm Duration Scale	
Unknown	
Temporary	Due to a medical error, the patient experiences harm that lasts for less than a year.
Permanent	Due to a medical error, the patient sustains harm that lasts for a year or more.

Source: American Society for Healthcare Risk Management (2014).

Additionally, according to the ASHRM (2014), harm duration and severity are often intertwined. When patients sustain mild harm, it is, by definition, always temporary. Most likely, in the case of the maculopapular rash, the patient would be prescribed a topical steroid and antihistamines and switched to a different medication. Based on this treatment regimen, the rash would likely resolve within two weeks of its onset. When patients sustain moderate or severe harm, it could either be temporary or permanent. In the case of ototoxicity, the patient's hearing loss is apt to be permanent.

Aminoglycosides, like Gentamicin, are known to cause irreversible hearing loss (Selimoglu, 2007).

Non, Partial, and Full Disclosure

Disclosure refers to what physicians tell patients and/or their families about a medical error that has occurred, provided they choose to say anything at all. According to Fein et al. (2007) and Espin, Levinson, Regehr, Baker, & Lingard (2006), there are three types of disclosure—full disclosure, partial disclosure, and non-disclosure.

When physicians articulate the causal link between medical errors and the harm, if any, patients sustained, they are engaging in full disclosure. For instance, let's imagine that an elderly, male patient with diabetes is admitted to the hospital for a gastrointestinal bleed. In preparation for an endoscopy, the treating physician says that he cannot have anything to eat or drink for the next few hours. Misinterpreting the physician's orders, a nurse gives him his insulin. Consequently, he becomes hypoglycemic, has a seizure, falls out of bed, and fractures his right hip. Following this incident, the physician tells the patient's wife and adult children, "'Your family member had low blood sugar, which caused him to fall out of bed and the reason that occurred was they got a dose of insulin, which they…should not have gotten'" (Fein et al., 2007, pg. 758). The physician clearly acknowledges the error that caused the patient's injuries.

In contrast, partial disclosure occurs when physicians do not articulate the relationship between a medical error and the resulting harm, if any. It also occurs when they mislead patients, implying they were harmed by the natural progression of their disease (Fein et al., 2007; Espin et al., 2006). For instance, imagine that a physician had told his diabetic patient, "'You had a seizure. We think it was because of your low blood

sugar"' (Fein et al., 2007, pg. 759). This explanation is misleading. Since individuals' blood sugar levels regularly fluctuate, the patient might not have questioned whether the seizure could have been prevented. However, if he is a savvy health care consumer, he might ask why his blood sugar was so slow. Prior research suggests that some physicians believe that it is acceptable to willingly deceive or mislead patients in some instances (Novack et al., 1989).

With non-disclosure, physicians do not tell patients anything. They do not acknowledge the error, mention the harm patients sustained, and/or directly link the error to the harm patients sustained. With non-disclosure, some physicians may be operating according to the principles of *caveat emptor,* or buyers beware. In the real estate market, *caveat emptor* refers to the fact that sellers do not have to voluntarily disclose their properties' defects and flaws, such as leaky pipes and termites, unless they are legally required to or specifically asked by potential buyers (Moses, Pebworth, & Olsen, 2017). Applied to medical error disclosure, the principles of *caveat emptor* suggest that physicians do not need to voluntarily disclose errors to patients unless they are specifically asked about them or legally required to do so. Thus, the burden of uncovering the truth falls on patients and their families, who may not have enough medical knowledge to know what questions to ask or realize that something has gone horribly wrong.

While Fein et al. (2007) limits their disclosure typology to medical errors, their discussion could also be applied to negligent and negligent adverse events. Following a negligent adverse event, full disclosure occurs when physicians clearly articulate the relationship between the harm their patients have sustained and their deviations from the

standard of care. If nurse Ben Geen had told his patients that he purposely sent them into cardiac arrest by giving them potentially lethal drugs, he would have been engaging in full disclosure. However, since statements like these amount to an admission of malicious intent, personal responsibility, and guilt, physicians are not going to share them with their patients. If physicians openly acknowledge their engagement in negligent acts, they know that they will most likely face severe sanctions. For instance, depending on the circumstances, they may lose their jobs, have their medical license revoked or suspended, and/or face life in prison.

Following a negligent adverse event, partial disclosure occurs when physicians acknowledge the harm that patients sustained but do not admit their role in causing that harm. They might even try to mislead their patients into thinking that what happened was unavoidable, simply a case of bad luck, and/or a natural progression of their disease. In the case of Ben Geen, partial disclosure occurred when he informed his patients of their cardiac arrest but did not acknowledge his role in triggering it. Partial disclosure should be more apt to occur following a negligent event than full disclosure, given that the former does not involve an admission of malicious intent and personal responsibility for what happened.

Harm, Apparentness, and the Disclosure of Medical Errors

When asked, many physicians state that medical errors should be disclosed and/or that they would disclose them to patients and their families (Garbutt et al., 2007; Linthorst, Kallimanis-King, Dekker, Hoekstra, & de Haes, 2012). Unfortunately, physicians do not always act in accordance with their beliefs. When medical errors occur, they are not always disclosed to patients and their families (Kronman et al., 2011;

Ghalandarpoorattar, Kaviani, & Asghari, 2012). Numerous regulatory, economic, social, and cultural factors may dissuade physicians from disclosing errors (Kaldjian, Jones, & Rosenthal, 2006), despite their ethical obligation to "be honest in all professional interactions" (American Medical Association, 2016, pg. 1).

Many physicians believe that near misses do not need to be disclosed (Garbutt et al., 2007; White et al., 2008). As a result, they may not disclose them to patients and their families. On the topic of near misses, one physician stated, "'I think if we were held to disclose all of those, I think that happens so often we wouldn't have the opportunity to practice medicine. My job is to relieve anxiety, not to create it'" (Gallagher, Waterman, Ebers, Fraser, & Levinson, 2003, pg. 1004). Since physicians have a limited amount of time to spend with each of their patients, they may forgo disclosure in favor of discussing more pressing issues, such as treatment options and side effects. Physicians may also forgo disclosing near misses because they do not want to appear incompetent or undermine patients' trust in them and the healthcare system.

In theory, many physicians support the disclosure of harmful minor[6] and serious[7] medical errors (Garbutt et al., 2007; White et al., 2008; Linthorst et al., 2012). However, following a minor or serious error, their malpractice concerns may influence whether they disclose it to patients and their families (White et al., 2008). The physician community is divided on the issue of whether disclosing harmful medical errors increases or decreases their malpractice risk. On this issue, one physician stated:

[6] According to Garbutt et al. (2007), a minor error is "an error that causes harm that is neither permanent nor potentially life-threatening" (pg. 180).
[7] According to Garbutt et al. (2007), a serious error is "an error that causes permanent injury or transient but potentially life-threatening harm" (pg. 180). For instance, amputating the wrong limb.

> ‘Everything you read and everything that you’re told says that you are supposed to tell what errors you make as soon as you can. Let them know what your thinking is, what you are going to do about it. And your chances of having an adverse litigation are less…. Now, the question is, how many of us believe that?’ (Gallagher et al., 2003, pg. 1004)

Physicians concerned about being sued may forgo disclosure because they do not want patients misconstruing what they say, interpreting it as an admission of legal liability, and suing them for malpractice (Bell et al., 2012). Following harmful errors, many patients want to know what happened (Gallagher et al., 2003). When deprived of this information, they may sue to uncover the truth (Hickson et al., 1992; Vincent et al., 1993; Vincent et al., 1994; Witman et al., 1996; Wu, 1999; Schwappach & Koeck, 2004).

In contrast, physicians who believe that disclosing harmful errors reduces their malpractice risk may be more apt to disclose them to patients and their families. If most patients sue to find out what happened to them, then physicians may have multiple personal and legal incentives to engage in disclosure. First, they would be sparing themselves the emotional and psychological anguish that often accompanies accusations of malpractice (Charles et al., 1988; Nash, Tennant, & Walton, 2004; Balch et al., 2011). Second, physicians could save themselves a significant amount of time and money, given that malpractice cases can take anywhere from a few months to a few years to be adjudicated (Seabury, Chandra, Lakdawalla, & Jena, 2013). Lastly, they would be shielding themselves from any negative publicity and reputational harm that could arise from their involvement in a lawsuit.

However, if other concerns prompt patients to sue, then disclosing medical errors probably would not reduce physicians' malpractice risk. Following disclosure, Witman et al. (1996) and Hobgood et al. (2005a) found that patients with moderate to severe injuries may be more apt to sue than patients with temporary, mild injuries. Since severe injuries, like paraplegia, can have a significant impact on patients' functional status and quality of life, they may sue to obtain the money they need to pay for rehabilitation services, purchase assistive devices, or hire a home care aid.

Physicians' willingness to disclose medical errors also may be influenced by apparentness, or how readily apparent or obvious the error is to patients and/or their families (Gallagher et al., 2006b; Loren et al., 2008; White et al., 2011). While prior research has classified errors as dichotomous, obvious or not obvious (White et al., 2011), or using vague quantifiers, like more apparent or less apparent (Gallagher et al., 2006b), apparentness lies on a continuum that ranges from not at all apparent to readily apparent. This continuum indicates that some medical errors are not at all apparent, such as being injected with 9, instead of 10, units of insulin, to readily apparent—wrong site surgery. For instance, a patient waking up after surgery only to find that their right, not left, foot was amputated.

By considering apparentness a unipolar phenomenon, we can explore the gray area between the two endpoints. Let us consider a retained sponge or surgical instrument. In and of itself, the presence of a retained sponge would not be readily apparent to patients upon waking after surgery. However, its presence could be made known through its adverse health consequences, such as severe pain at the surgical site or the development of an infection or abscess (Zejnullahu, Bicaj, Zejnullahu, & Hamza, 2017).

In one situation, a patient could live with it inside of them for years without experiencing any adverse health effects. However, another patient could experience severe pain. Once patients experience discomfort and seek care, the retained foreign body would be brought to their attention.

Prior research suggests that physicians are more apt to disclose more apparent errors, compared to less apparent errors (Gallagher et al., 2006a; Loren et al., 2008; White et al., 2011). Physicians may be less apt to disclose less apparent, or non-apparent, errors due to asymmetric information. Since they have more clinical expertise than their patients, patients may not realize that an error has occurred. Thus, they would not have a reason to question the quality or appropriateness of the care they are receiving. In contrast, when errors are readily apparent, patients and their families may inquire about what happened. If an explanation is not forthcoming, they may consider litigation as a means of uncovering the truth (Hickson et al., 1992; Vincent et al., 1993; Vincent et al., 1994; Wu, 1999; Schwappach & Koeck, 2004).

Institutional, Regulatory, and Provider-level Factors that Impact Disclosure

In the proceeding section, we examined the relationship between harm, apparentness, and disclosure. In this section, we will examine how the various institutional, regulatory, and provider-level factors depicted in Figure 7 impact physicians' willingness to disclose medical errors and adverse events to patients and their families. Due to the physician community's preoccupation with issues related to medical malpractice, the relationship between the medicolegal environment and disclosure will be emphasized.

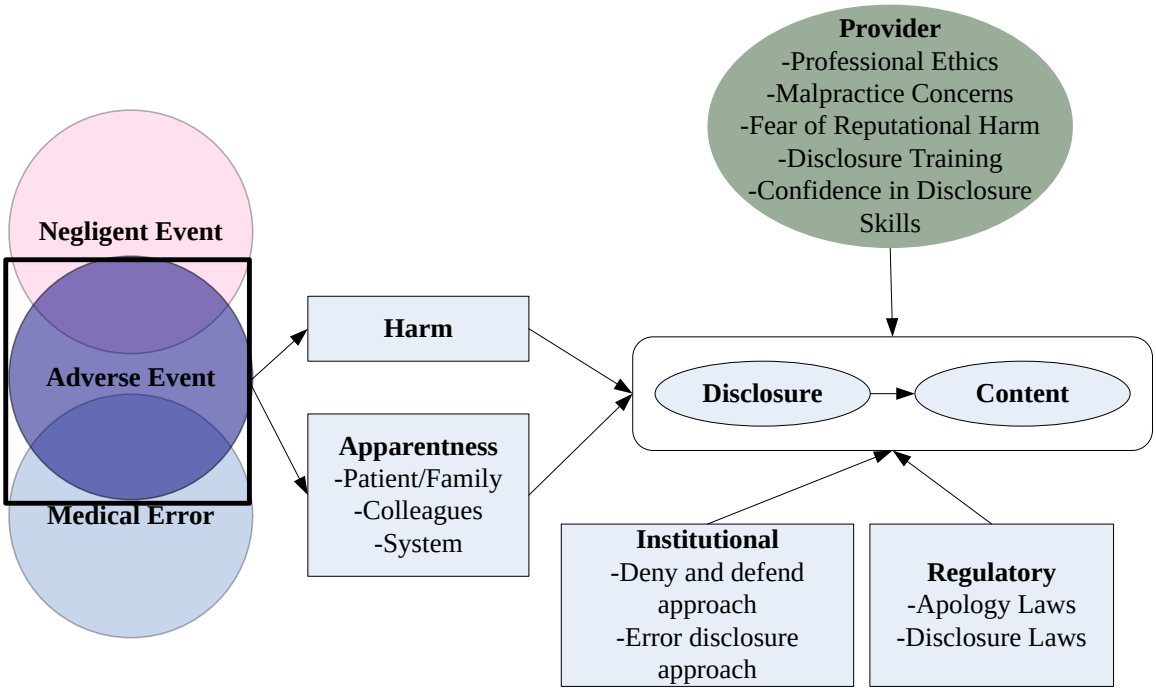


Figure 7: Regulatory, Institutional, and Provider-level Factors That Influence Disclosure

Faced with the prospect of litigation, physicians have an incentive to disclose more apparent medical errors. Gallagher et al.'s (2003) study suggests that when disclosure follows more apparent errors, physicians often choose their words very carefully. For instance, when presented with a vignette depicting an insulin overdose due to sloppy penmanship, one physician said he would disclose the following: "'You got a big bunch of insulin and your blood sugar went down, and we got that fixed up and we're glad you're great'" (pg. 1004). By not explicitly mentioning the error, the physician may have been trying to absolve himself from reputational harm and legal liability. Alternatively, if physicians do not believe that disclosing medical errors will reduce their chances of being sued for malpractice, then they have no legal incentive to disclose.

Physicians who want to disclose readily apparent or harmful errors may believe that they are prohibited from doing so by their malpractice insurers. According to Liang (2004), many insurance policies contain a "'no statements/no actions' clause" (pg. 68). Under this provision, insured physicians are prohibited from doing or saying anything that could be interpreted as an admission of liability, such as telling patients that they were harmed by a medical error. If physicians disclosed this, their insurers may refuse to defend them in court or pay for the expenses associated with litigation, such as jury awards for injured patients' economic and non-economic losses. Alternatively, insurers may revoke their coverage.

While some hospital administrators and physicians may believe that disclosure will result in coverage loss, Banja (2005) argues that their beliefs are erroneous and not supported by existing legal precedents. The courts have only allowed insurers to deny coverage when insured individuals do not cooperate with their efforts to investigate claims. Individuals may be considered uncooperative if they fail to notify their insurers of a covered incident in a timely manner, do not answer questions about the incident, or fail to appear in court. The truthful disclosure of medical errors is not considered sufficient grounds for coverage loss.

Furthermore, if physicians are sued for malpractice due to their involvement in an error, they are not likely to experience an increase in their malpractice premiums, given the current structure of the medical liability insurance market. For many types of insurance products, like auto insurance, individuals' premiums are experience rated. With auto insurance, this means that drivers that cause an accident will have to pay a higher premium than drivers who are not involved in an accident (Fournier & McInnes, 2001).

In contrast, physicians' malpractice premiums are rarely experience rated (U.S. Congress, Office of Technology Assessment, 1993; Fournier & McInnes, 2001; CunninghamGroup, 2015), so those who are sued are not apt to pay a higher premium than their counterparts who have not been sued. Essentially, physicians who are at a low risk of being sued are subsidizing the premiums of those who are at a higher risk of being sued (Fournier & McInnes, 2001). Numerous factors may contribute to the lack of experience rating in the medical liability marketplace, including the physician community's strong opposition to experience rating (Sloan, 1990) and the difficulties associated with accurately predicting a physician's risk of being sued, given the relatively small number of claims filed against any particular physician at any given time (CunninghamGroup, 2015).

In addition to liability concerns, many physicians cite a lack of confidence in their disclosure skills and abilities as barriers to disclosing medical errors (Fein et al., 2005). Perhaps, they are not sure whether what happened was an error, how to disclose errors, or what they should tell patients and their families (Kaldjian, Jones, Rosenthal, Tripp-Reimer, & Hillis, 2006). Numerous theories of behavioral change suggest that self-confidence plays a significant role in the performance of specific behaviors and behavioral change (Dixon, 2008). Considering this, physicians may be able to increase their confidence in their disclosure skills through disclosure trainings that focus on role playing possible disclosure scenarios. Prior research on disclosure training programs for medical students indicate that formalized training increases their self-confidence and self-efficacy with respect to knowing how to initiate disclosure conversations, what to say, and how to respond to patients and their families' emotional responses and questions (Bonnema, Gosman, & Arnold, 2009; Gunderson, Smith, Mayer, McDonald, &

Centomani, 2009; Sukalich, Elliott, & Ruffner, 2014). Similarly, some physicians and nurses working in obstetrics at five hospitals operated by Ascension Health reported an increase in their disclosure behaviors following training in medical error disclosure (Hendrich, McCoy, Gale, Sparkman, & Santos, 2014). Taken together, these findings suggest that when faced with a situation warranting disclosure physicians who have received formal training will be more apt to engage in disclosure than their counterparts who have not been trained. Some physicians state that they would like to receive disclosure education, training and/or support (Garbutt et al., 2007).

Another core issue is the impact of errors on physicians and the norms surrounding discussion of those errors. Following medical errors, physicians report experiencing a myriad of negative emotional and physiological responses, including anxiety, sleeplessness, guilt, decreased self-confidence, inadequacy, and decreased job satisfaction (Wu et al., 2003; Hobgood et al., 2005b; Waterman et al., 2007; Schwappach & Boluarte, 2009). To help them cope, many physicians express a strong desire for support from the institutions they work for. Sadly, this support is often not forthcoming. In a study of U.S. and Canadian physicians, Waterman et al. (2007) found that 90% of the physicians they surveyed disagreed with the statement "that hospitals and health care organizations adequately support them in coping with stress associated with medical errors" (pg. 470). As such, they are left to seek social support elsewhere. Many physicians report discussing medical errors with their colleagues (Garbutt et al., 2007; Bari et al., 2016). These discussions may help physicians learn from their mistakes. Physicians who discussed their errors with their colleagues reported making constructive

changes, such as seeking help from their colleagues, to the way they practice medicine (Wu et al., 2003).

When physicians learn about or witness their colleagues' mistakes, they are not apt to disclose them to the affected patients or their families. According to Gallagher et al. (2013), numerous barriers may deter physicians from disclosing their colleagues' mistakes. For instance, since they were not directly involved in the patients' care, they may feel like they do not have enough information about what happened. Without all the facts, they may opt to say nothing out of fear of misleading patients or saying something that is not true. Alternatively, they may have all the facts but refuse to disclose them to patients and their families because they are concerned about tarnishing their colleagues' reputations or triggering unnecessary malpractice litigation.

They may also be reluctant to disclose their colleagues' mistakes because they believe that it is not their responsibility. Mazor, Roblin, Greene, Fouayzi, and Gallagher (2016) found that primary care physicians were more apt to disclose errors that they believed both they and their colleagues shared responsibility for than those they believed their colleagues were solely responsible for. Thus, if physicians believe that their colleagues are not going to disclose their mistakes, then they have little reason to proactively disclose them to patients and their families.

Physicians practice within formal organizations that, as noted elsewhere, may have adopted policies and implemented protocols to encourage the truthful, timely disclosure of medical errors and adverse events (Kraman & Hamm, 1999; Helmchen, 2008; Boothman et al., 2009). However, their institutional history and culture may work against these changes. Historically, many health systems have adhered to, and continue to

adhere to, a deny-and-defend approach to patient grievances following unanticipated health outcomes (Boothman et al., 2009). Under this approach, health systems and liability insurers discourage physicians from disclosing pertinent information to patients and their families because they do not want them to say anything that could be used against them in court. And, when patients file a lawsuit, "the prudent insurer and its counsel urge secrecy, dispute fault, deflect responsibility, and make it as slow and expensive as possible for plaintiffs to continue the fight" (Sage, 2004a, pg. 11).

Vigorous denial and deflection do not create an environment that is conducive to disclosure. It only serves to reinforce human beings' natural tendency to engage in self-preservation using defense mechanisms, like denial, rationalization, or displacement (Grohol, 2017). In a study of how physicians cope with medical errors, Wu, Folkman, McPhee, and Lo (1993) found that some physicians coped by implementing defense mechanisms. For example, after making an error that led to congestive heart failure, one resident said, "'I can occasionally rationalize that I was not the proximate cause of his death, as the patient was deteriorating slowly, but I must accept that I likely accelerated the course of his demise'" (Wu et al., 1993, pg. 567).

To create an environment that is more conducive to acceptance and disclosure, some health systems have discarded their deny-and-defend approach in favor of an active disclosure approach. Under this approach, health systems are committed to disclosing errors to patients and their families (Kraman & Hamm, 1999; Boothman et al., 2009; Peto, Tenerowicz, Benjamin, Morsi, & Burger, 2009). For instance, the University of Michigan Health System (UMHS) adopted a disclosure, apology, and offer approach in 2001. According to Boothman et al. (2009), when medical errors occur, risk management

personnel and physicians are proactive, investigating what happened. The purpose of these investigations is to determine whether physicians' actions were reasonable, given the circumstances, and whether the care provided adversely impacted patients' health and well-being. When patients are injured by unreasonable care, they disclose what happened, offer compensation, if needed, and implement policies and procedures aimed at preventing similar occurrences in the future. However, if an internal "investigation concludes that medical staff did all that they could [to prevent what happened] the system will stand behind its employees," defending them when disgruntled patients or their families file a lawsuit (Alexander, 2014, pg. 1). After implementing this approach, the UMHS experienced a significant decrease in malpractice litigation (Kachalia et al., 2010). This suggests that physicians are proactively engaging in disclosure, given patients and their families' propensity to sue for malpractice when physicians are not forthcoming about what happened (Hickson et al., 1992; Vincent et al., 1993; Vincent et al., 1994; Wu, 1999; Schwappach & Koeck, 2004). While there is a trend towards disclosure, the past may persist indefinitely. Organizational policies may change quickly and drastically but it takes time to change human behavior.

To facilitate health systems and physicians' adoption of active disclosure practices, some state legislatures have adopted apology and/or disclosure laws (Mastroianni et al., 2010). Apology laws make expressions of sympathy and/or admissions of fault inadmissible in court, depending on the state, while disclosure laws require health systems and/or providers to tell patients about unanticipated health outcomes, depending on the state. Since these laws are limited in scope, they may not facilitate disclosure or reduce the incidence of malpractice litigation, given that they do

not fulfill patients' emotional and informational needs. Following a medical error, many patients want an apology, an explanation of what happened, and assurance that steps will be taken to prevent similar occurrences in the future. Denied this, they may sue for malpractice (Hickson et al., 1992; Vincent et al., 1993; Vincent et al., 1994; Witman et al., 1996; Wu, 1999; Schwappach & Koeck, 2004). And, even when provided with that information, some patients still opt to sue for malpractice (Witman et al., 1996; Mazor et al., 2004; Hobgood et al., 2005a).

Even if apology and disclosure laws afforded physicians greater protection against malpractice litigation, it probably would not increase their willingness to disclose. For decades, physicians have been closing ranks and portraying themselves as infallible healers of human suffering, a practice that can be traced back to the 1800's (De Ville, 1992). Thus, if physicians willingly engaged in disclosure, they would not only be violating the norms of their community but also tarnishing their own self-image—that of a knowledgeable, competent healer. Any acknowledgement of a mistake or error is often interpreted as a sign of their carelessness or incompetence (Institute of Medicine, 2000).

Physicians' need for self-preservation perpetuates the belief that physicians are perfect amongst both physicians and patients, an illusion that makes both parties ill-equipped to deal with mistakes. According to Dr. Hilfiker (1985):

> We [physicians] are not prepared for our mistakes, and we don't know how to cope with them when they occur. Doctors are not alone in harboring expectations of perfection. Patients, too, expect doctors to be perfect. Perhaps patients have to consider their doctors less prone to error than other people: how else can a sick or injured person, already afraid, come to trust the doctor?...But the degree of

> perfection expected by patients is no doubt also a result of what we doctors have come to believe about ourselves, or better, have tried to convince ourselves about ourselves. (pg. 76-77)

Given how firmly entrenched the illusion of perfection is amongst physicians and patients, it will take more than a few laws to facilitate behavior change.

Conclusion

Numerous philosophical, ideological, institutional, and medicolegal factors may influence physicians' willingness to disclose medical errors and adverse events to patients and/or their families. Given the medical community's preoccupation with malpractice risk, physicians' disclosure practices may be heavily influenced by their beliefs regarding the relationship between disclosure and malpractice risk. Physicians that believe disclosure will reduce their malpractice risk will be more apt to disclose an adverse event than their counterparts who believe that disclosure increases their malpractice risk. The latter often believe that patients will file a lawsuit, using any statements made during disclosure against them in court (Bell et al., 2012). And, since the more severe the injuries; the greater the likelihood of a lawsuit (U.S. Congress, Office of the Technology Assessment, 1993), physicians' willingness to disclose may decrease as the severity of patients' injuries increase.

Additionally, physicians' willingness to disclose may be influenced by the culture of medicine as well as their workplaces' policies and procedures. For decades, the medical community has internalized and propagated the image of physicians as infallible healers of human suffering. Considering this, physicians may be reluctant to engage in disclosure, fearing that it will tarnish their profession's image and decrease patients' trust

in them and their colleagues. Nevertheless, the government and various healthcare institutions are trying to change the culture of medicine through the implementation of disclosure programs and policies. Following the implementation of its disclosure and compensation program, the University of Michigan Health System experienced a decrease in malpractice litigation, suggesting both that physicians are disclosing errors and patients are less apt to sue for information on what happened to them. Nevertheless, old habits are difficult to change, so creating a healthcare system where timely disclosure is the norm will require a significant investment of time and effort—both on the part of those physicians whose behaviors must change and those responsible for holding them accountable.

Chapter III: Methodology

Study Design

In approaching my research questions, I considered different study designs and data collection methods, including observation, focus groups, and survey methods. I decided not to engage in naturalistic or participant-observation for three reasons. First, I would have had to regularly shadow physicians, be able to accurately identify when a medical error or adverse event has occurred and determine whether it was disclosed to the patient and/or their families. I felt ill-equipped to do this, given that I am not a physician. My lack of medical knowledge would probably have biased my results. Second, since many physicians, especially surgeons, work long, irregular hours, sometimes over sixty hours a week, I would have been unable to observe some of them engage in disclosure. My school, work, and personal obligations would have prevented me from shadowing physicians at all hours of the day and night week after week for months on end. Lastly, if I had chosen direct observation, I could have found myself confronting some murky, ethical issues. If I had noticed physicians about to make a mistake, I would have been torn between pointing it out to them and allowing them to proceed so that I could further my research agenda. Most likely, I would have done the former, compromising the integrity of my research.

I also considered conducting focus groups with physicians but decided against them for two reasons. First, physicians are extremely busy, which could make it difficult for them to participate in a two-hour focus group. Second, since prior focus group and interview research suggests that there might be a relationship between harm severity,

apparentness, and disclosure (Gallagher et al., 2003), I decided that it was time to move beyond exploratory research towards explanatory research.

Prior cross-sectional, survey research on the relationship between harm severity and disclosure has either focused on physicians practicing in other countries (Gallagher et al., 2006a; Linthorst et al., 2012), or those practicing at two academic medical centers in Missouri and Washington (Gallagher et al., 2006a; Garbutt et al., 2007; Loren et al., 2008; White et al., 2008; White et al., 2011). Additionally, they have focused on pediatricians and pediatric residents (Garbutt et al., 2007; Loren et al., 2008), internists (Linthorst et al., 2012), internal medicine trainees (White et al., 2008; White et al., 2011), or physicians in a variety of specialties (Gallagher et al., 2006a). While the results of these studies suggest that there is a relationship between harm severity and disclosure, their generalizability to physicians practicing in other states may be limited, given the unique attributes of each state's medicolegal environment. Missouri has enacted an apology law while Washington has enacted both apology and disclosure laws. In contrast, Minnesota has not enacted either of these laws (Mastroianni et al., 2010). To see if the results of the aforementioned studies are applicable to Minnesota's physician population, I choose to conduct a cross-sectional survey of Minnesota physicians using simple random sampling.

Survey Development

To answer my research questions, I developed survey questions and clinical vignettes, following the process depicted in Figure 8. I started by reviewing some of the existing survey instruments related to patient safety, such as the Hospital Survey on Patient Safety Culture (Agency for Healthcare Research and Quality, 2017), the Medical

Student Safety Attitudes and Professionalism Survey (Liao et al., 2014), the Error Orientation Questionnaire (Rybowiak, Garst, Frese, & Batinic, 1999), and the Safety Attitudes and Safety Climate Questionnaire (Sexton et al., 2006). Using these documents, I compiled a list of questions that captured the different components of my conceptual model (Figure 5). I wrote my own questions to capture aspects of my model that were not assessed in the reviewed questionnaires.

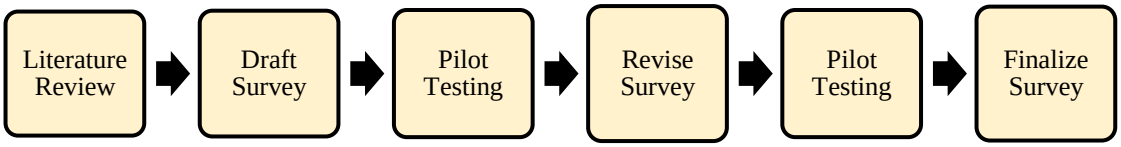


Figure 8: Survey Development Process

Simultaneously, I reviewed the literature on error disclosure to find vignettes that varied in terms of harm severity and apparentness. I selected four vignettes from studies conducted by Espin et al. (2006), Fein et al. (2007), and White et al. (2011). The vignettes are displayed in Table 6. I chose these vignettes because they were developed in collaboration with physicians and nurses and have undergone several rounds of pilot-testing to ensure that they were realistic and factually accurate (Espin et al., 2006; White et al., 2011). Since I do not have a clinical background, I wanted to ensure that any vignettes I used were accurate, given that unrealistic scenarios could jeopardize the validity and reliability of my results.

Table 6: Clinical Vignettes

Source	Vignette
Espin et al. (2006)	You are seeing a patient 3 weeks after elective splenectomy for ITP. The splenectomy was technically challenging because of the patient's obesity, but seemed uncomplicated. At this follow-up visit, the patient complains of vague persistent left upper quadrant (LUQ) pain. You send the patient for an abdominal x-ray film, which shows a foreign body consistent with a retained surgical sponge in the patient's LUQ. You remember that the sponge count was correct at the end of the procedure. However, you also remember that you packed off a small bleeding vessel near the stomach with a sponge, and do not recall removing the sponge. When you review the postoperative records, you observe that a math error was responsible for a falsely correct sponge count. You believe a subsequent operation to remove the retained sponge is indicated, and expect the patient will make a full recovery
Espin et al. (2006)	The scrub and circulating nurses, anesthesia resident, and anesthesiologist are in the operating room prior to a liver transplant. The anesthesiologist asks out loud if the patient has any allergies. While the scrub nurse is busy arranging the surgical instruments, the resident is busy with another task, and neither of them responds; however, the circulating nurse says, "I didn't check the patient in, but no, I don't think so." The anesthesiologist proceeds to inject Cefazolin into the patient's IV. Later, the anesthesiologist checks the patient's chart and discover that the patient has an allergy to penicillin
Fein et al. (2007)	A 62-year-old diabetic patient with chronic renal insufficiency is admitted to the hospital with a new onset gastrointestinal bleed. He is made NPO (nothing by mouth) for endoscopy, but his medications were not held. Because of severe hypoglycemia the patient had a seizure, fell of his bed, and fractured his hip
White et al. (2011)	You have admitted a diabetic patient to the hospital for a chronic obstructive pulmonary disease (COPD) exacerbation. You handwrite an order for the patient to receive "10 U" of insulin. The "U" in your order looks like a 0. The following morning, the patient is given 100 U of insulin, 10 times the patient's normal dose, and is later found unresponsive, with a serum glucose level of 35mg/dL (1.94 mmol/L). The patient is resuscitated and transferred to the intensive care unit where they are expected to make a full recovery.

After drafting my survey, I conducted cognitive interviews with a convenience sample of physicians (n = 8) practicing in the Twin Cities metropolitan area in the spring of 2017. Since I was concerned about interpersonal variation in physicians' definition and understanding of medical errors, preventable adverse events, and adverse events, I asked

my interviewees to define and give some examples of each concept. I presented each vignette to them one at a time and asked to them to tell me whether it was plausible and factually accurate, given that I do not have a background in medicine. I also asked them whether the vignette depicted a medical error, preventable adverse event, adverse event, or something else. If they choose the latter, they were asked to elaborate on their response. A copy of my interview script is included in Appendix A.

Many physicians found the term preventable adverse event confusing. Instead, they preferred to use the phrase medical error with harm or medical error without harm. Based on their comments, I removed the phrase preventable adverse event(s) from my survey. I replaced it with one of the following phrases: medical error(s), harmful medical error(s), a medical error that has no potential to harm the patient, a medical error that could potentially harm the patient but does not, a medical error that causes mild harm, a medical error that causes moderate harm, or a medical error that causes serious harm.

Additionally, many physicians thought that my vignettes were outdated or unrealistic, given the policies and procedures being implemented at their institution, across the state, and nationwide, to improve patient safety. In response, I removed them from my survey and started searching the published literature for more timely, relevant examples of medical errors and adverse events. While using Google to search for examples, I found the National Rural Bioethics Project's website, which contained numerous vignettes that depicted medical errors or adverse events. After reviewing each vignette, I selected 18 that suited my research purposes. They varied in terms of the type of event depicted (i.e. medical error or adverse event), the level of harm, if any, the patient sustained, and how readily apparent what happened would have been to patients

and/or their families. Then, I emailed Ann Freeman Cook, Ph.D., the Director of the National Rural Bioethics Project, asking for her permission to use and modify some of the vignettes for research purposes, which she freely granted.

After making all the necessary changes to my survey, I programmed it into Qualtrics™ (2017-2018) so that I could conduct another round of pilot testing in August through October of 2017. I conducted a pilot test using a convenience sample of Minnesota physicians who had an email address on file with the Minnesota Board of Medical Practice. To reduce response burden, 4 of the 18 vignettes were randomly presented to each physician, who was asked to assess its plausibility and factual accuracy. Also, they were asked to state whether the vignette depicted a medical error, adverse event, or something else and to identify the level and duration of harm the patient sustained, if any. A copy of the questions asked is included in Appendix B. Four hundred fifty-six physicians responded to the survey.

Based on physicians' feedback, I revised the vignettes to improve their readability and factual accuracy. I also removed one of them from my survey because it depicted a near miss, which is not the focus of this study. I only retained the vignettes that depicted a medical error or adverse event.[8]

Afterwards, I created two versions of my final survey. One version focused on the disclosure of medical errors while the other focused on the disclosure of adverse events. A copy of the medical error disclosure and adverse event disclosure survey is included in

[8] Cohen's Kappa, a measure of inter-rater reliability, was used to assess the level of agreement between my classification and physicians' classification of the type of event being depicted (i.e. medical error or adverse event), the level of harm the patient sustained, and how apparent what happened is to the patient and/or their family. Overall, there was good agreement on the type of event depicted ($k = 0.6844; p - value < 0.0001$), moderate agreement on harm severity ($k = 0.4456; p - value < 0.0001$), and fair agreement on apparentness ($k = 0.2000; p - value < 0.0001$).

Appendix C and D, respectively. I created two surveys to reduce the cognitive burden placed on potential respondents. I also hoped to prevent any confusion or measurement error that could arise from using both terms on the same survey.

The medical errors survey contained 114 questions and the adverse events survey contained 99 questions. Due to the nature of medical errors, the former had more questions than the latter. Medical errors may or may not be harmful, so respondents were asked their likelihood and comfort disclosing both harmful and unharmful errors. In contrast, adverse events are always harmful. Regardless of the survey version, I grouped questions capturing similar aspects of my conceptual model together. Each survey has 7 sections—legal considerations, human fallibility, practice culture, professional ethics, self-efficacy, clinical scenarios, and about you (i.e. demographic information). The following is a brief description of each section:

- *Legal considerations:* These questions were designed to capture physicians' beliefs regarding the relationship between disclosure and patients and/or their families'.

  propensity to sue for malpractice.
- *Human fallibility:* These questions were designed to capture how physicians feel about having to admit their mistakes.
- *Practice culture:* These questions were designed to assess the extent to which improving patient safety is valued in physicians' workplaces. They also were asked about the disclosure practices, or lack thereof, that exist in their workplace.
- *Professional ethics:* These questions were designed to assess whether physicians believe that engaging in disclosure is the right thing to do. It also measures their

likelihood of disclosing medical errors or adverse events that vary in terms of harm severity and apparentness.

- *Self-efficacy:* The questions in the self-efficacy section were designed to capture how much training and experience physicians have disclosing medical errors and adverse events as well as how comfortable they would feel disclosing them.
- *Clinical vignettes:* Physicians were presented with 4 vignettes that varied in terms of harm severity and apparentness. For each one, they were asked to determine the level of harm the patient sustained, how apparent what happened would be to the patient and/or their family, their likelihood of disclosing what happened, and the likelihood that their disclosure would prompt a malpractice lawsuit.
- *About you:* Physicians were asked to provide some basic demographic information—race, ethnicity, sex, age, speciality, number of years in practice, practice location, and their prior involvement in malpractice litigation, if any.

Since survey respondents are more apt to answer close-ended versus open-ended questions (Griffith, Cook, Guyatt, & Charles, 1999; Reja, Manfred, Hlebec, & Vehovar, 2003), most of my survey questions were close-ended. This was a deliberate choice made in hopes of reducing response burden; thereby, decreasing the likelihood that respondents would stop answering questions partway through the survey (i.e. partial non-response).

The clinical vignettes were placed towards the end of the survey after careful consideration of the tradeoffs between non-response and measurement concerns (Dillman, Christian, & Smyth, 2014). Compared to placing cognitively demanding and potentially threatening items first, the survey literature suggests that placing low cognitive burden, non-threatening topically related items at the start of a survey helps to

increase response rates (Dillman et al., 2014). Since reading, interpreting, and responding to vignettes is a cognitively demanding task and the prospect of disclosure is an emotionally triggering, threatening endeavor, I decided to place the vignettes towards the end of the survey.

Vignette Assignment

Physicians assigned to the medical error disclosure survey were randomly assigned to 1 of 3 clinical vignette groups—medical error group 1, medical error group 2, or medical error group 3. In each group, physicians received 4 scenarios—3 depicting a medical error and 1 depicting an adverse event. Similarly, physicians assigned to the adverse events disclosure survey were randomly assigned to 1 of 3 groups: adverse event group 1, adverse event group 2, or adverse event group 3. Physicians received 4 scenarios—3 depicting an adverse event and 1 depicting a medical error. In total, there are 17 different vignettes (9 medical error, 8 adverse event).

The purpose of presenting physicians with both medical error and adverse event vignettes was to obtain data for a subsequent study on priming effects, a potential source of survey bias. According to Parkin (2008), "priming is a psychological process in which exposure to a stimulus activates a concept in memory that is then given increased weight in subsequent judgement tasks. Priming works by making the activated concept accessible so that it can be used in evaluating related objects" (pg. 216). By placing the vignettes after dozens of attitudinal questions, it is expected that physicians who receive the medical error survey would misclassify the adverse event vignette as a medical error vignette. And, those who receive the adverse event survey would misclassify the medical error vignette as an adverse event vignette.

The vignettes used varied in terms of apparentness and harm severity (see Table 7). I used the data from my second round of pilot testing to help me classify each vignette as depicting a medical error or adverse event and to assess the severity of the harm the patient sustained. Since I did not assess incident apparentness during my cognitive interviews, the apparentness classifications (readily apparent vs. not readily apparent) are based on my assessment of how readily apparent the medical error or adverse event would be to patients and/or their family. Table 8 outlines the rationale for my apparentness ratings for each scenario. Appendix E contains a copy of each vignette.

Table 7: Vignette Randomization

	Medical Error	Adverse Event	Harm Severity	Apparentness
Medical Error Group 1				
CT Scan	Yes	--	Mild	Not Readily Apparent
Retained Sponge	Yes	--	Moderate	Not Readily Apparent
Prostate Cancer	Yes	--	Severe	Not Readily Apparent
Leukemia	--	Yes	Mild-Moderate	Readily Apparent
Medical Error Group 2				
Childhood Vaccination	Yes	--	Mild	Not Readily Apparent
Foot Amputation	Yes	--	Severe	Readily Apparent
IV Mix-up	Yes	--	Death	Not Readily Apparent
Chemotherapy	--	Yes	Moderate	Readily Apparent
Medical Error Group 3				
Breast Biopsies	Yes	--	Moderate	Not Readily Apparent
Knee Replacement	Yes	--	Severe	Readily Apparent
IV Mix-up	Yes	--	Death	Not Readily Apparent
Gastrointestinal Bleed	--	Yes	Moderate-Severe	Readily Apparent
Adverse Event Group 1				
Allergic Reaction	--	Yes	Mild	Not Readily Apparent
Shunt Revision	--	Yes	Moderate	Not Readily Apparent
Gastrointestinal Bleed	--	Yes	Moderate-Severe	Readily Apparent
IV Mix-up	Yes	--	Death	Not Readily Apparent
Adverse Event Group 2				
IV Infiltration	--	Yes	Mild	Readily Apparent
Birth Control	--	Yes	Moderate	Not Readily Apparent
Appendectomy	--	Yes	Death	Readily Apparent
CT Scan	Yes	--	Mild	Not Readily Apparent
Adverse Event Group 3				
IV Infiltration	--	Yes	Mild	Readily Apparent
Gastrointestinal Bleed	--	Yes	Moderate-Severe	Readily Apparent
Appendectomy	--	Yes	Death	Readily Apparent
Hearing Loss	Yes	--	Moderate	Not Readily Apparent

Table 8: Rationale for Apparentness Classification

Vignette	Classification	Rationale
CT Scan	NRA	Given the patient's cognitive impairment, they probably would not realize that the CT scan was performed on the wrong body part. And, in the absence of timely disclosure, what happened probably would not be apparent to the patient's family.
Appendectomy	RA	The patient's death would be apparent to their family.
GI Bleed	RA	Since a wave of dizziness preceded the patient's fall, they would be able to link their fall and resulting fracture to their dizziness, which is a common side effect of diazepam.
Allergic Reaction	NRA	The cause of the rash would not be readily apparent to the patient, given they do not have any known drug allergies. Additionally, it could have been caused by something else they were exposed to.
Retained Sponge	NRA	The retained sponge is not readily apparent to the patient, given that 3 weeks elapsed between their surgery and follow-up visit.
Prostate Cancer	NRA	The laboratory mix-up and its possible contribution to the patient's metastatic prostate cancer were not apparent to the patient. The mix-up went undetected for a year.
Breast Biopsies	NRA	The specimen mix-up would not have been apparent to the patient and/or their family, especially in the absence of disclosure.
Foot Amputation	RA	Upon waking from surgery, the patient would have realized that the healthy, not diseased, foot was accidentally amputated.
Shunt Revision	NRA	Most likely, the patient and/or their family would not have realized that the placement of the feeding tube caused the pneumonia, given that hospital-acquired pneumonia is fairly common.
IV Infiltration	RA	The swelling around the IV insertion site was apparent to the mother, given that she called for assistance.
IV Mix-up	NRA	The cause of the patient's death would not have been apparent to their family. The patient could have passed away from the flu, not the mix-up.
Hearing Loss	NRA	The physician's failure to promptly review the patient's lab results would not have been apparent to them and/or their family. Thus, they would not have known about the drug-induced hearing loss.
Knee Replacement	RA	Upon waking from surgery, the patient would have realized that the wrong knee was replaced.

Birth Control	NRA	The patient did not realize she was experiencing side effects from birth control.
Breast Cancer	RA	The patient should have realized she was experiencing the common side effects of chemotherapy, given they would have been disclosed to her prior to treatment.
Leukemia	RA	The patient's parents should have realized he was experiencing the common side effects of chemotherapy, given they would have been disclosed to them prior to treatment.
Childhood Vaccination	NRA	The patient's mother did not know that her child had already received all the required vaccinations, resulting in the duplicate administration of the Hib vaccine.

Notes:

RA = Readily Apparent, NRA = Not Readily Apparent

Sampling Method

My population of interest is physicians currently practicing medicine in Minnesota. I obtained a list of 15,470 licensed, practicing physicians from the Minnesota Board of Medical Practice, which served as my sampling frame. It contained physicians' licensure number, name, specialty, mailing address (office or home), and email address (personal or professional). From this list, I identified 698 duplicate entries. Physicians practicing multiple specialties were listed once for each subspecialty. From all these duplicates, I only randomly selected one entry from my listings. Upon inspecting the list further, I noticed quite a few incomplete addresses (e.g. streets without a building number; clinics/hospitals without a street address, etc.). Additionally, most physicians did not have an email address listed.

Since data quality issues can contribute to coverage error, I used the internet to fill-in as much missing information as possible. I visited the websites of the clinics/hospitals listed and searched for physicians' postal and email addresses. When mailing addresses were not listed, I used their workplace address as their mailing address.

While most of the websites did not list email addresses, I was still able to find quite a few of them. Unfortunately, since I did not keep track of my internet searches, I am unable to provide data on the number of postal and email addresses I found.

After updating my sampling frame, I selected a simple random sample of 1,565 physicians. Of those selected, 341 (21.79%) only had a postal address listed. The remaining 1,224 (78.21%) physicians had both a postal and email address listed. The number of physicians selected was based on resource constraints, not statistical power calculations. I selected the maximum number of physicians I could afford to study, given the costs associated with printing and disturbing my surveys (e.g. postage and printing costs).

Table 9 provides a detailed breakdown of the reasons for respondent ineligibility. The American Association for Public Opinion Research's *Standard Definitions* were used to classify ineligible respondents (American Association for Public Opinion Research, 2016). Thirty-eight physicians refused to participate in the study (code 2.11).

I was unable to determine the eligibility of 104 physicians due to bad contact information. More specifically, 13 web invitations were returned as undeliverable (code 3.30). Amongst mailed surveys, 18 were returned undeliverable as addressed (code 3.31), 39 were returned because the potential respondent had moved and left no forwarding address (code 3.32), and 17 were returned unable to forward, not deliverable as addressed (code 3.3141). One mailed survey was returned due to the absence of a mail receptacle (code 3.253) while four were returned because no such address existed (code 3.3131). Ten mailed surveys were returned with forwarding information (code 3.40). Follow-up mailings were sent to the forwarding address provided by the postal service.

Table 9: Reasons for Respondent Ineligibility

Group	Code	Reason	Number of Respondents
NE Mail Only	n	Sample size	341
	1.0	Returned questionnaire	57
	2.11	Eligible, refused	2
	3.31	Undeliverable as addressed	12
	3.3141	Unable to forward, not deliverable as addressed	3
	3.32	Moved, left no address	12
	3.40	Returned with forwarding information	4
	4.10	Selected respondent screened out of sample	3
	Replace n		36
Exp. Mail Only	n	Sample size	306
	1.0	Returned questionnaire	62
	3.253	No mail receptacle	1
	3.31	Undeliverable as addressed	3
	3.3141	Unable to forward, not deliverable as addressed	9
	3.32	Moved, left no address	11
	3.34	Temporarily away, holding period expired	1
	3.40	Returned with forwarding information	4
	4.10	Selected respondent screened out of sample	5
	Replace n		21
Exp. Mail-Web	n	Sample size	306
	1.0	Returned questionnaire	58
	2.11	Eligible, refused	8
	3.30	Invitation returned as undeliverable	5
	3.31	Undeliverable as addressed	2
	3.3141	Unable to forward, not deliverable as addressed	1
	3.32	Moved, left no address	9
	3.40	Returned with forwarding information	1
	4.10	Selected respondent screened out of sample	3
	Replace n		0
Exp. Web-Mail	n	Sample size	306
	1.0	Returned questionnaire	68
	2.11	Eligible, refused	4
	3.30	Invitation returned undeliverable	4
	3.31	Undeliverable as addressed	1
	3.3131	No such number	4
	3.3141	Unable to forward, not deliverable as addressed	4
	3.32	Moved, left no address	7
	3.34	Temporarily away, holding period expired	1
	3.40	Returned with forwarding information	1
	4.10	Selected respondent screened out of sample	1
	Replace n		20
Exp. Web Only	n	Sample size	306
	1.0	Returned questionnaire	47
	2.11	Refusal	24
	3.30	Invitation returned undeliverable	4
	4.10	Selected respondent screened out of sample	7

	Replace n		3
Overall Sample	n	Sample size	306
	1.0	Returned questionnaire	292
	2.11	Eligible, refused	38
	3.253	No mail receptacle	1
	3.30	Invitation Returned as Undeliverable	13
	3.31	Undeliverable as addressed	18
	3.3131	No such number	4
	3.3141	Unable to forward, not deliverable as addressed	17
	3.32	Moved, left no address	39
	3.34	Temporarily away, holding period expired	2
	3.40	Returned with forwarding information	10
	4.10	Selected respondent screened out of sample	19
	Replace n		80

Notes:
NE = non-experimental; Exp. = experimental

The large number of physicians who could not be contacted suggests that they are not regularly contacting the Minnesota Board of Medical Practice to update their contact information. Instead, they may only be updating their contact information once a year as part of the license renewal process (Minnesota Board of Medical Practice, 2016). The amount of undeliverable mail could also be the result of poor data entry and management practices.

Nineteen physicians called or wrote to the researcher explaining their ineligibility for the study, namely that they were retired, no longer practicing medicine, or primarily engaged in research or administrative work (i.e. disposition code 4.10). All the cover letters and emails sent out stated that the population of interest was Minnesota physicians currently practicing medicine. Compared to retired physicians, who may not have practiced medicine for years, currently practicing physicians are apt to be aware of the discourse surrounding disclosure and patient safety at their institutions and nationally. As part of the survey, physicians were asked about disclosure practices and patient safety initiatives in their workplace.

For those who were deemed ineligible or could not be contacted, a replacement element was randomly drawn to replace the sampled element (Kish, 1965). More specifically, prior to each reminder mailing, I removed both ineligible physicians and those with bad contact information from my sample. I replaced them with another physician that I randomly selected from my sampling frame. In total, I replaced 81 of the 123 physicians who were ineligible or could not be contacted. The remaining 42 physicians were not replaced because they were deemed ineligible after the final mailings had been sent out.

Survey Mode Randomization

In addition to the substantive research questions this study aims to answer, a supplemental mode experiment was embedded within it to determine the impact the mode of survey administration has on the physician response rate. Specifically, I conducted a cross-sectional, experimental, mixed-mode study of licensed physicians currently practicing in Minnesota. I randomly assigned the selected physicians to different survey modes (i.e. mail only, mail-web, web-mail, or web only). Figure 9 outlines the mixed-mode design I used for this study.

Physicians without an email address (n = 341) were automatically allocated to the non-experimental, mail-only group. Physicians with both a postal and email address (n = 1,224) were randomly assigned to one of four groups: mail only, mail-web, web-mail, and web only. Three hundred and six physicians were assigned to each group.

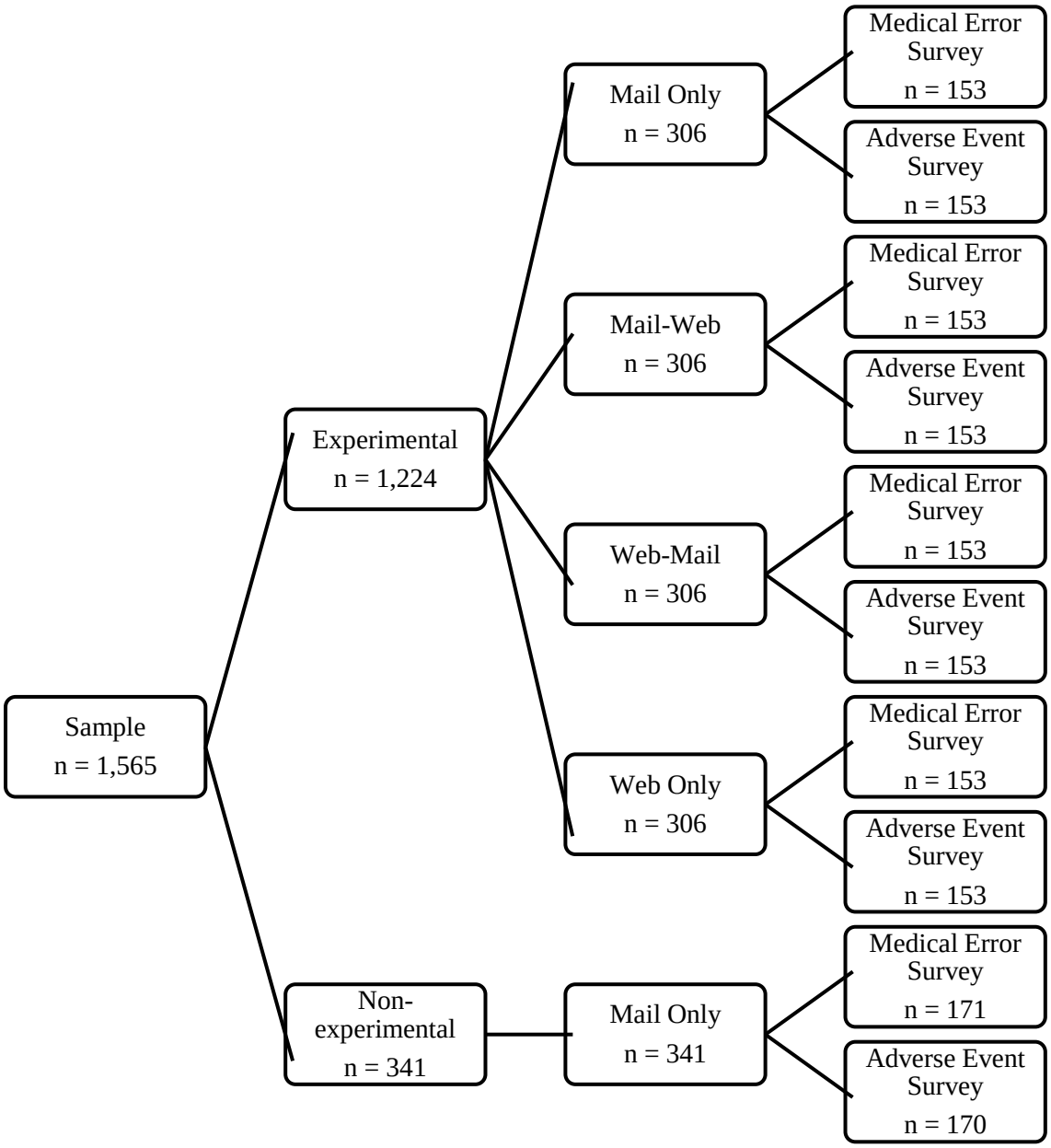


Figure 9: Crossover, Mixed-mode Study Design

Survey Version Assignment

To avoid mode effects, or changes in participants' responses caused by differences in the layout and design of paper and web surveys (Dillman et al., 2014), an effort was made to ensure that the design and layout of the web and paper surveys were

as similar as possible. The web and paper survey questions were displayed in the same order. And, most of the web survey questions were formatted like those on the paper survey with one notable exception. On the web survey, some of the tables used to display the statements that participants were asked to rate how strongly they agree or disagree were broken down into two smaller tables. This was done to improve their appearance and readability on mobile devices, particularly smartphones.

Within each of the groups, physicians were randomly assigned to receive either the medical error disclosure survey or adverse event disclosure survey. In the non-experimental group, 171 and 170 physicians were assigned the medical error disclosure survey and the adverse event disclosure survey, respectively. Within each of the experimental group, 153 physicians were randomly assigned to each version of the survey. In total, 783 physicians were assigned to receive the medical error disclosure survey. The remaining 782 were assigned to receive the adverse events disclosure survey.

Data Collection Procedures

Between November 2017 and February 2018, 1,565 physicians were invited to participate in this study. All surveys were administered according to the flowchart depicted in Figure 10. All mail contacts included a cover letter printed on the University of Minnesota, Twin Cities letterhead. It detailed the purpose of the survey, why they were selected, and statements regarding the voluntary, confidential nature of their participation. Copies of the cover letters used for the initial and follow-up mailings are included in Appendices F through H. Enclosed with the letter was a copy of potential respondents' assigned survey booklet and a business reply envelope.

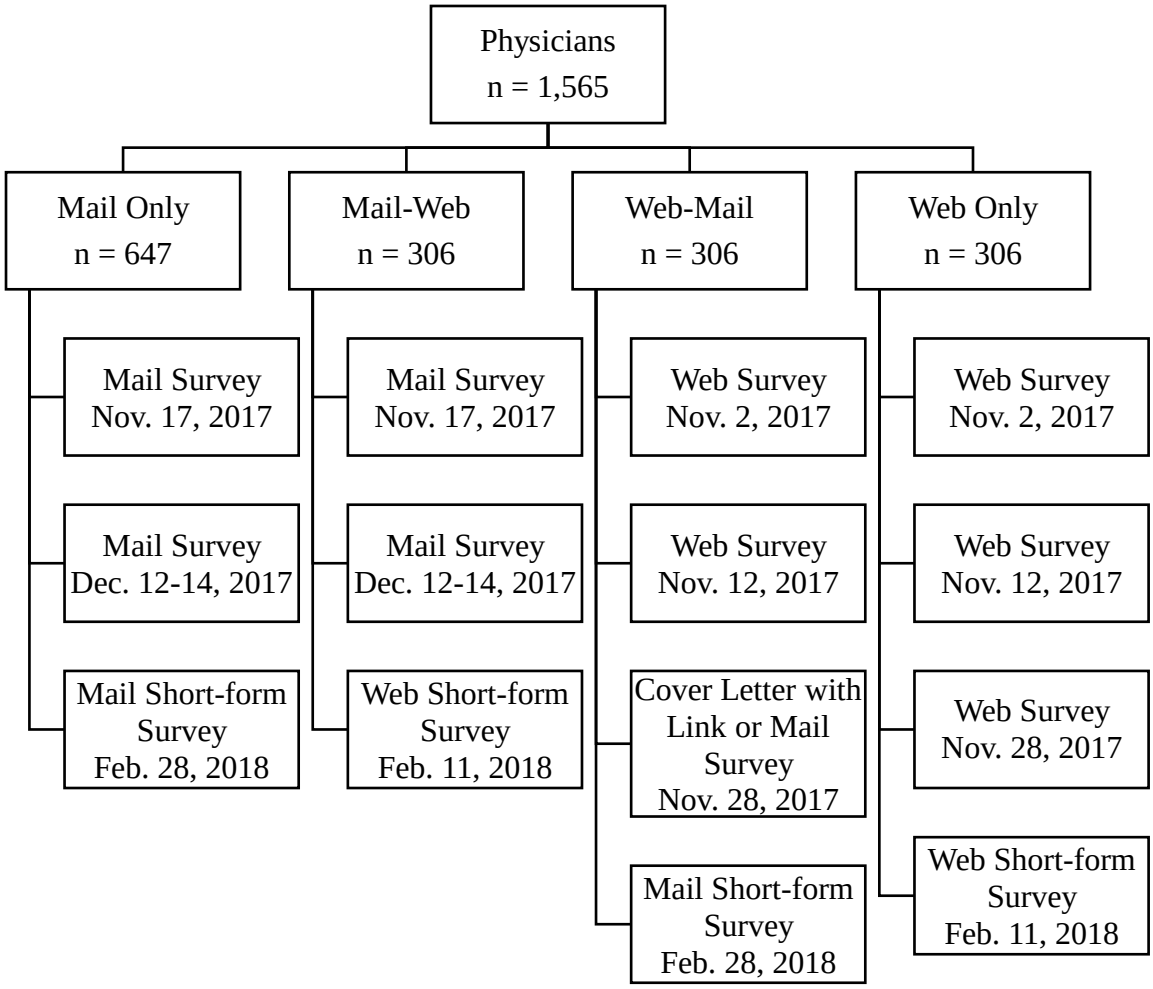


Figure 10: Survey Administration Procedures

The paper surveys were returned to me at the School of Public Health at the University of Minnesota, Twin Cities. Using the unique identifiers printed on the survey booklets, I was able to identify who returned the survey as well as what mode and survey version they were assigned. When physicians responded to the survey, refused to complete it, or were deemed ineligible, I ceased all contact with them.

Since sending multiple reminders can increase the response rate (Barclay, Todd, Finlay, Grande, & Wyatt, 2002; Puleo et al., 2002; Bjertnaes, Garrett, & Botten, 2008),

initial non-responders in the mail-only groups were sent up to two additional mailings. While the first reminder increased the response rate, it was still quite low. In an effort to increase it further, a shortened version of each survey, referred to henceforth as the short-form, was used for the final mailings, given that the response rate amongst physicians to shorter questionnaires is greater than it is for longer ones (Kellerman & Herold, 2001; Jepson, Asch, Hershey, & Ubel, 2005; VanGeest, Johnson, & Welch, 2007; Flanigan, McFarlane, & Cook, 2008; Glidewell et al., 2012). Since some of the questions were designed to capture similar pieces of information, I removed some of them from the original survey versions. For example, I removed the following question: "In your workplace, how much of a priority is patient safety—the top priority, in top 3, in top 5, in top 10, or less than that?" With this question removed, I could still get a sense of how much of a priority patient safety is by looking at physicians' responses to some of the other attitudinal questions. For instance, please rate how strongly you agree or disagree with the following statements: "In my workplace, reporting medical errors to the institution (e.g. risk managers, patient safety advocates, etc.) is considered an important component of patient safety" and "In my workplace, it is easy for me to learn from others' mistakes." The short-form medical error and adverse event surveys contained 97 and 84 questions, respectively. Copies of the short-form medical error disclosure survey and adverse event disclosure survey can be found in Appendix I and J, respectively.

I used Qualtrics™ (2017-2018) to administer the web surveys. All emails sent to potential respondents explained the purpose of the study, why they were chosen, and the voluntary, confidential nature of their participation. The emails also included a personalized, hyperlink to the survey. Participants could access the survey by clicking on

the link or copying and pasting it into their web browser. Copies of the initial and follow-up emails sent are included in Appendices K through N as well as Appendix R.

Physicians assigned to the web-mail group received up to two emails inviting them to participate in the survey. For the third mailing, non-responders were randomly assigned to one of two follow-up options. Half of non-responders received a cover letter, printed on the University of Minnesota, Twin Cities letterhead. It reiterated the importance of the study and provided them with a personalized link to the survey (Appendix O). To access the survey, they had to type the URL into their web browser. To reduce the burden placed on potential respondents, a URL shortener was used to shorten the lengthy, personalized links provided by Qualtrics™ (2017-2018). The remaining non-responders were sent a reminder letter (Appendix P), paper copy of their assigned survey booklet, and a business reply envelope. The final, follow-up reminder sent to non-responders in the web-mail group consisted of a cover letter (Appendix Q), copy of the short-form survey, and a business reply envelope.

At the end of the data collection period, all returned surveys were brought to Northwest Keypunch, Inc., where they were entered into a database by data entry professionals. Upon return of the surveys and receipt of the database, I randomly spot-checked the data to ensure its accuracy. All web survey data were automatically populated into a database by Qualtrics™ (2017-2018). I downloaded a copy of it and merged it with the file from Northwest Keypunch, Inc. prior to data analysis.

Prior research indicates that offering incentives is an effective means of increasing the response rate amongst physicians (Pit, Vo, & Pyakurel, 2014; Abdulaziz et al., 2015; Young et al., 2015). And, in a study of radiologists at academic medical

centers, Ziegenfuss, Niederhauser, Kallmes, and Beebe (2013) found that responders preferred the chance to win an iPad to the guarantee of receiving a $5 Amazon giftcard upon completion and receipt of the survey. Considering these findings, all potential respondents were offered an incentive to participate in this study. Those who returned the survey were entered into a drawing for 1 of 4 tablets (approximate market value $500). Winners were notified via email or postal mail in the summer of 2018 and given their choice of an iPad or Android tablet. All study protocols were approved by the Institutional Review Board at the University of Minnesota, Twin Cities.

Response Rate and Non-response Analysis

In total, 292 physicians responded to the survey, resulting in an overall response rate of 18.0%. For decades, the physician response rate has been declining (Cull, O'Connor, Sharp, & Tang, 2005; Cook, Dickinson, & Eccles, 2009; Cho, Johnson, & VanGeest, 2013; McLeod, Klabunde, Willis, & Stark, 2013), so it is not uncommon to see low to moderate physician response rates (Yusuf & Baron, 2006; Golnik, Ireland, & Borowsky, 2009; Wong et al., 2009; Einarsson et al., 2010; Nahed et al., 2012; Pereira, Lewin, Yousem, & Yousem, 2014; Tawfik et al., 2018). While the response rate varied across modes, the differences were not statistically significant (see Table 10). Roughly 16% of physicians assigned to the web-only group responded to the survey compared to 21.2% of physicians assigned to the web-mail group.

Table 10: Response Rates by Mode of Administration

Overall	NE Mail Only	Exp. Mail Only	Exp. Mail-Web	Exp. Web-Mail	Exp. Web Only
18.0%	15.2%	19.3%	19.1%	21.2%	15.6%

Notes:

NE = non-experimental; Exp. = Experimental

Table 11 compares the practice areas of respondents and non-respondents. There were not any statistically significant differences in the reported specialties of respondents and non-respondents, regardless of how non-response was defined.

Table 11: Self-reported Specialty by Response Status

Response Status	Generalist Practice	Specialist Practice	X^2	P-value
Respondents	44.37% (130)	55.63% (163)	2.4782	0.115
Refusers	57.89% (22)	42.11% (16)		
Respondents	44.37% (130)	55.63% (163)	1.9368	0.164
Group 1	48.86% (643)	51.14% (673)		
Respondents	44.37% (130)	55.63% (163)	2.4630	0.117
Group 2	49.47% (606)	50.53% (619)		
Respondents	44.37% (130)	55.63% (163)	1.9566	0.162
Group 3	48.89% (637)	51.11% (666)		

Notes:

Group 1 includes all potential participants who did not complete or refuse to complete the survey.

Group 2 includes all potential participants who did not complete or refuse to complete the survey, excluding those who could not be contacted due to incorrect postal addresses and/or undeliverable mail.

Group 3 includes all potential participants who did not complete or refuse to complete the survey, excluding those who could not be contacted due to bounced email addresses.

Generalist practice includes the following practice areas: Emergency Medicine, Family Medicine, and Internal Medicine.

Specialist practice includes the following practice areas: Allergy and Immunology, Anesthesiology, Dermatology, Medical Genetics and Genomics, Neurological Surgery, Neuromusculoskeletal Medicine, Nuclear Medicine, Obstetrics and Gynecology, Ophthalmology, Ophthalmology and Otolaryngology, Orthopedic Surgery, Otolaryngology, Pathology, Pediatrics, Physical Medicine and Rehabilitation, Plastic Surgery, Preventative Medicine, Psychiatry and Neurology, Radiology, Surgery, Thoracic Surgery, and Urology

Table 12 compares the practice location of respondents and non-respondents. To determine location, I merged the state licensure database with the 2004 ZIP RUCA Code files for the state of Minnesota, which was obtained from the Washington, Wyoming,

Alaska, Montana, and Idaho (WWAMI) Rural Health Research Center (WWAMI, 2007). Overall, most respondents and non-respondents practice in an urban area. There were not any statistically significant differences in the practice location of respondents and non-respondents, regardless of how non-response was defined.

Table 12: Rural-Urban Commuting Area (RUCA) by Response Status

	Urban	Large Rural City	Small Rural	P-value
Respondents	83.22% (243)	10.96% (32)	5.82% (17)	0.348
Refusers	92.11% (35)	7.89% (3)	0.00% (0)	
Respondents	83.22% (243)	10.96% (32)	5.82% (17)	0.221
Group 1	86.92% (1,143)	8.82% (116)	4.26% (56)	
Respondents	83.22% (243)	10.96% (32)	5.82% (17)	0.151
Group 2	87.42% (1,070)	8.33% (102)	4.25% (52)	
Respondents	83.22% (243)	10.96% (32)	5.82% (17)	0.217
Group 3	86.94% (1,132)	8.83% (115)	4.22% (55)	

Notes:

Group 1 includes all potential participants who did not complete or refuse to complete the survey.

Group 2 includes all potential participants who did not complete or refuse to complete the survey, excluding those who could not be contacted due to incorrect postal addresses and/or undeliverable mail.

Group 3 includes all potential participants who did not complete or refuse to complete the survey, excluding those who could not be contacted due to bounced email addresses.

It was not possible to compare respondents and non-respondents on other demographic variables that could affect the response rate, such as sex, age, and the number of years in practice. This information was unknown to the researcher and the state licensure board. Having access to more demographic variables would have allowed for a more thorough exploration of the possibility of non-response bias. The ability to conduct a detailed analysis is important, given that prior research suggests that

responders and non-responders to physician surveys may differ in terms of key demographic variables, like gender, age, and number of years in practice (Cull et al., 2005; McFarlene, Olmsted, Murphy, & Hill, 2007; Bjertnaes, Garratt, & Botten, 2008).

Statistical Approach

Principal components factor analysis was used to determine whether the attitudinal items could be combined into a series of latent variables. All latent variables identified were included as explanatory variables in subsequent regression analyses.

Afterwards, a correlational analysis using Fisher's Exact Test was conducted to examine whether there was an association between harm severity, apparentness, and disclosure. Initially, harm severity had six categories—unknown, none, mild, moderate, severe, and death. However, due to the paucity of values in some categories, they were combined into low (i.e. unknown, none, and mild), moderate, or severe (i.e. severe and death) harm. While apparentness was originally measured on an 11-point scale (0 = not readily apparent; 10 = readily apparent), it was transformed into a categorical variable, given the paucity of responses in the middle of the scale. It was recoded as not readily apparent (0 – 4), somewhat apparent (5 – 9), and readily apparent (10). Similarly, the likelihood of disclosure was originally measured on a 10-point scale (1 = highly unlikely; 10 = highly likely). However, due to a paucity of responses on the lower end of the scale, it was transformed into both a dichotomous and ordinal variable. The dichotomous variable was coded a 1 for highly likely to disclose and 0 otherwise. The ordinal disclosure variable had three categories—unlikely (1 – 4), somewhat likely (5 – 8), and highly likely (9 – 10) to disclose.

If the Fisher's Exact Test yielded statistically significant results, then the relationship between harm severity, apparentness, and disclosure was examined using Somers' *D*. It is a non-parametric, rank statistic used to examine the association between an ordinal independent and dependent variable. Somers' *D* lies between -1 and 1, inclusive. The closer it is to -1 or 1, the greater the model's predictive ability (Wagner & Gillespie, 2019). Specifically, Somers' *D* was used to determine whether more severe harm is associated with an increased likelihood of disclosure, compared to less severe harm. It was also used to determine whether more apparent incidents are associated with an increased likelihood of disclosure, compared to less apparent incidents.

Two bivariate probit regression models were used to examine the relationship between harm severity, apparentness, and disclosure, controlling for physicians' sociodemographic characteristics, general attitudes towards disclosure, and comfort engaging in disclosure. In Model I, no interaction terms were included. In Model II, an interaction term was included in the regression to test the hypothesis that the relationship between harm severity and disclosure varies depending on physicians' perceived risk of being sued for malpractice—very unlikely, unlikely, likely, or very likely. Additionally, two ordered probit regression models were used to examine the relationship between harm severity, apparentness, and disclosure. Except for the coding of the dependent variable, these two models were identical to the two aforementioned bivariate probit models. After estimating each regression model, the probability of disclosure was estimated for the independent variables of interest—apparentness, harm severity, and the interaction between harm severity and malpractice risk.

Since physicians responded to multiple scenarios, their responses to them are apt to be correlated, resulting in serial correlation, sometimes referred to as auto correlation. In the presence of serial correlation, regression coefficients will not be biased; however, their standard errors will be underestimated. Since small standard errors contribute to inflated test statistics, the chances of obtaining statistically significant results and making a Type I error (i.e. rejecting the null hypothesis when it is true) increases (Studenmund, 2006). To address the possibility of serial correlation, all regression models were estimated using cluster-robust standard errors grouped at the physician level.

For all analyses, the data from the medical error and adverse event scenarios were analyzed separately. Physicians' classification of each scenario as either a medical error or adverse event was used to subset the data for analysis. Results with a p-value less than 0.05 were considered statistically significant. All analyses were performed using STATA Version 15 (StataCorp, 2017).

Chapter IV: Latent Variable Analysis

Overview of Factor Analysis

Given the relatively small sample size (n = 292), I performed a series of factor analyses to reduce the number of variables included in the regression analyses. A principal components factor analysis (PCA) was performed using both an orthogonal (i.e. varimax) and oblique (i.e. promax) rotation. PCA is used to evaluate the correlation amongst items to determine whether they are measuring the same underlying construct. When a group of items is related to one another, then factor analysis identifies this grouping as a factor. The strength of the relationship between an item and a particular factor is measured using factor loading scores. A high factor loading indicates that an item is strongly associated with a particular factor. In contrast, a low factor loading indicates that the item is not strongly correlated with a particular factor. Items were retained and considered to be associated with a particular factor if they met one of the following criteria:

1) Eigenvalue greater than 1,
2) Had a factor loading score greater than or equal to 0.60 and did not load at greater than 0.40 on more than one of the factors identified, or
3) Had a factor loading score that was at least 0.20 greater than its loading score on all other factors identified.

After determining the items that would be retained on each factor, Bartlett's sphericity test was used to determine whether they are indeed correlated with one another. If they are correlated, then they can be combined to form a single variable (Pett, Lackey, & Sullivan, 2003). A p-value of 0.05 was used to determine statistical

significance. The Kaiser-Meyer-Olkin (KMO) test for sampling adequacy was also conducted on all retained items to determine whether performing a factor analysis was appropriate, given the data (Pett et al., 2003). If the KMO statistic was ≥ 0.500, the analysis was considered appropriate.

For items that were not appropriate for a factor analysis because they represented a cumulative hierarchy, a Mokken analysis was conducted. The goal was to determine whether a group of items formed a unidimensional scale composed of hierarchically ordered items measuring the same underlying construct. To determine scalability, Loevinger's H coefficient was used. For each item, it measures its correlation with all the other items included in the scale. The data from the medical error and adverse event survey versions were analyzed separately. All analyses were performed using STATA Version 15 (StataCorp, 2017).

Results

Table 13 presents the exact question wording and factor loading scores for each of the latent variables identified during the factor analysis of the data from the medical error and adverse event surveys. The information seeking grouping consists of questions that capture one of the things that may prompt patients' and/or their families to sue for malpractice—a lack of information about what happened to them or their loved ones during diagnosis and treatment. Patients and/or their families may sue for malpractice to find out what happened to them, especially in the absence of timely, honest disclosure (Hickson et al., 1992; Vincent et al., 1993; Vincent et al., 1994; Witman et al., 1996).

Table 13: Factor Analyses Results, By Survey Type

	Medical Error		Adverse Event	
Question	Factor 1	Factor 2	Factor 1	Factor 2
Part A: Information Seeking (initial model 4)				
Failing to disclose (harmful medical errors/adverse events) to patients and/or their families will make them suspicious of a cover-up and more likely to sue for malpractice.	0.8439		0.8314	
Patients harmed by (medical errors/adverse events) invariably want to know the truth, and when deprived of it, will consider litigation.	0.8439		0.8314	
Bartlett's Test of Sphericity (p-value)	<0.01*		<0.01*	
Kaiser-Meyer-Olkin (KMO) Test	0.5000		0.5000	
Part B: Blame Culture and Safety Culture (initial model 12)				
In my workplace, direct care providers (e.g. physicians, nurses) feel like their mistakes are held against them.	0.6850		0.6433	
In my workplace, it is difficult for direct care providers (e.g. physicians, nurses) to discuss patient safety issues.	0.7445		0.6945	
In my workplace, it is difficult for me to speak up when I perceive a problem with patient safety.	0.7732		0.7524	
My supervisor/manager routinely overlooks patient safety problems that happen repeatedly.	0.6279		0.4518	
When I have patient safety concerns, my colleagues encourage me to report them to the appropriate personnel (e.g. my supervisor, risk managers, patient safety advocates, etc.).		0.8088		0.7045
In my workplace, when changes are made to improve patient safety, their effectiveness is evaluated.		--		0.6942
My supervisor/manager seriously considers my suggestions for improving patient safety.		0.7977		0.7522

In my workplace, it is easy for me to learn from others' mistakes.		0.6792		0.6437
In my workplace, the procedures and systems that are in place are good at preventing (medical errors/adverse events) from happening.		0.8045		0.7479
In my workplace, reporting (medical errors/adverse events) to the institution (e.g. risk managers, patient safety advocates, etc.) is considered an important component of patient safety.		0.7446		0.8445
In my workplace, direct care providers (e.g. physicians, nurses) are regularly doing things to improve patient safety.		0.8372		0.6827
Bartlett's Test of Sphericity	<0.01*		<0.01*	
KMO Test	0.8178		0.8350	
Part C: Likelihood of Disclosing Unharmful and Harmful Medical Errors (initial model 6)				
How likely or unlikely would you be to disclose the following to one of your patients and/or their families, if it was to occur:				
A near miss	0.9318			
A medical error that has no potential to harm the patient	0.9679			
A medical error that could potentially harm the patient but does not	0.8644			
A medical error that causes mild harm		0.6462		
A medical error that causes moderate harm		0.9678		
A medical error that causes serious harm		0.9546		
Bartlett's Test of Sphericity	<0.01*			
KMO Test	0.6727			
Part D: Likelihood of Disclosing Adverse Events (initial model 3)				
How likely or unlikely would you be to disclose the following to one of your patients and/or their families, if it was to occur:				
An adverse event that causes mild harm			0.6715	

An adverse event that causes moderate harm			0.9527	
An adverse event that causes serious harm			0.7638	
Bartlett's Test of Sphericity			<0.01*	
KMO Test			0.3983	
Part E: Comfort Disclosing Unharmful and Harmful Medical Errors (initial model 10)				
How comfortable or uncomfortable would you feel disclosing the following to one of your patients and/or their families, if it was to occur:				
A medical error that is *not* readily apparent to the patient and:				
Has no potential to harm the patient	1.0472			
Could potentially harm the patient but does not	0.9540			
A medical error that is readily apparent to the patient and:				
Has no potential to harm the patient	0.8026			
Could potentially harm the patient but does not	0.6621			
A medical error that is *not* readily apparent to the patient and:				
Causes mild harm		0.6899		
Causes moderate harm		0.9472		
Causes serious harm		1.0137		
A medical error that is readily apparent to the patient and:				
Causes mild harm		0.7927		
Causes moderate harm		0.9945		
Causes serious harm		1.0142		
Bartlett's Test of Sphericity	<0.01*			
KMO Test	0.8000			
Part F: Comfort Disclosing Adverse Events (initial model 6)				
How comfortable or uncomfortable would you feel disclosing the following to one of your patients and/or their families, if it was to occur:				
An adverse event that is *not* readily apparent to the patient and:				
Causes mild harm			0.8806	

Causes moderate harm	0.9692	
Causes serious harm	0.9110	
An adverse event that is readily apparent to the patient and:		
Causes mild harm	0.9113	
Causes moderate harm	0.9671	
Causes serious harm	0.9111	
Bartlett's Test of Sphericity	<0.01*	
KMO Test	0.7311	

Notes:

The factor loadings reported are from the principal components factor analysis with an oblique, promax rotation.

* Denotes statistical significance at the 0.05 level of significance.

The blame culture grouping consists of questions that capture attributes of an organizational blame culture. Often, in a culture of blame, the root causes of medical errors and preventable adverse events are not investigated, disclosed, or addressed. Instead, health care providers may be blamed and feel shamed for the errors that occur, which encourages them to hide their mistakes and not discuss and learn from them or those of others (Radhakrishna, 2015; Zabari & Southern, 2018). Additionally, the focus on finding fault with providers ignores the fact that some errors are caused by faulty systems and procedures.

The safety culture grouping is comprised of questions that capture attributes of an organizational safety culture. According to Becker's Hospital Review (2014), in a culture of safety, health care providers, and other key personnel, are actively doing things to prevent errors, reporting errors when they occur, and learning from their mistakes and those of others. Learning and continuous quality improvement are the hallmarks of an active safety culture. The blame culture and safety culture groupings are weakly correlated ($r = -0.3094$).

The likelihood of disclosing unharmful and harmful medical errors groupings consist of questions that capture how likely physicians are to disclose these types of errors, respectively. Prior research suggests that physicians' willingness to disclose errors may be influenced by the severity of harm patients sustain—with their support for disclosing serious errors exceeding their support for disclosing minor errors (Garbutt et al., 2007; White et al., 2008; Linthorst et al., 2012). Additionally, some physicians believe that near misses do not need to be disclosed to patients and/or their families (Garbutt et al., 2007; White et al., 2008; Gallagher et al., 2003). However, in reality, they may not act in accordance with their beliefs. When medical errors occur, they are not always disclosed to patients and/or their families (Kronman et al., 2011; Ghalandarpoorattar et al., 2012).

Similarly, the comfort disclosing unharmful and harmful medical errors groupings consist of questions that capture how comfortable physicians feel disclosing these types of errors, respectively. Physicians may have differing levels of comfort when it comes to disclosing unharmful versus harmful errors. This may be due to the physician community's preoccupation with and fear of being sued for malpractice as evidenced through their self-reported engagement in defensive medicine (Studdert et al., 2005; Nahed et al., 2012; Sethi et al., 2012; Ramella et al., 2015; Reisch et al., 2015). Physicians may feel more comfortable disclosing unharmful errors because they do not have to worry about saying something that could be used against them in court. If they happen to say something incriminating, they are unlikely to be sued for malpractice. Lawyers may be unwilling to try these types of cases because the monetary costs associated with doing so are apt to outweigh the benefits. In contrast, physicians may feel

more uncomfortable disclosing harmful errors because they are worried about saying something incriminating, which could be used against them in court. Lawyers' willingness to try cases involving harmful errors should increase as the severity of the harm patients sustain increases, given the possibility of recovering sizeable economic and non-economic losses.

The results of the factor analyses performed on the adverse event data is similar to those obtained using the medical error data with one notable exception. Since adverse events, by definition, cause harm, there is no scale for the likelihood of disclosing unharmful events or comfort disclosing unharmful events.

Table 14 displays the results of the reliability analysis by survey type. For most groupings, Cronbach's Alpha exceeds 0.60, indicating that they have moderate, internal consistency. The questions on each subscale form a cohesive grouping that is different from the content measured by the other subscales.

Table 14: Reliability Analysis, By Survey Type

	Cronbach's Alpha	
Grouping	Medical Error	Adverse Event
Information Seeking	0.5959	0.5531
Blame Culture	0.6749	0.5096
Safety Culture	0.8833	0.8505
Likelihood of Disclosing Unharmful Errors	0.9116	--
Likelihood of Disclosing Harmful Errors	0.8008	--
Likelihood of Disclosing Adverse Events	--	0.6399
Comfort Disclosing Unharmful Errors	0.9368	--
Comfort Disclosing Harmful Errors	0.9762	--
Comfort Disclosing Adverse Events	--	0.9651

Table 15 displays the results of the Mokken analyses by survey type. Since all the values of Loevinger's H exceed the recommended lower bound cutoff for a

unidimensional scale, the items can be treated as part of a unidimensional scale. All coefficients were statistically significant (p-value < 0.001).

Table 15: Scales for Not Readily Apparent and Readily Apparent Medical Errors and Adverse Events

Item	Loevinger's Coefficient	
	Medical Error	Adverse Event
Part A: Not Readily Apparent Medical Errors		
How likely or unlikely would you be to disclose the following to one of your patients and/or their families, if it was to occur: A medical error that is *not* readily apparent to the patient and:		
Has no potential to harm the patient	0.6911	
Could potentially harm the patient but does not	0.7235	
Causes mild harm	0.6830	
Causes moderate harm	0.7026	
Causes serious harm	0.6230	
Part B: Readily Apparent Medical Errors		
How likely or unlikely would you be to disclose the following to one of your patients and/or their families, if it was to occur: A medical error that is readily apparent to the patient and:		
Has no potential to harm the patient	0.7566	
Could potentially harm the patient but does not	0.7860	
Causes mild harm	0.7697	
Causes moderate harm	0.6891	
Causes serious harm	0.5485	
Part C: Not Readily Apparent Adverse Events		
How likely or unlikely would you be to disclose the following to one of your patients and/or their families, if it was to occur: An adverse event that is *not* readily apparent to the patient and:		
Causes mild harm		0.5687
Causes moderate harm		0.7506
Causes serious harm		0.5675
Part D: Readily Apparent Adverse Events		
How likely or unlikely would you be to disclose the following to one of your patients and/or their families, if it was to occur: An adverse event that is readily apparent to the patient and:		
Causes mild harm		0.5935
Causes moderate harm		0.8035
Causes serious harm		0.5904

Scale Scoring

Upon completion of the factor and Mokken analyses, scale scores were created for use in subsequent regression analyses. For each respondent, a scale score was calculated after missing values had been checked. Any scale with more than 50% of items without a response were not included in the calculations. The scale score was computed by taking the average of the numerical values respondents provided for the items included in a particular scale. All scores were considered continuous.

Table 16 displays summary statistics for each of the scales identified during the analysis. For the medical error and adverse event blame culture scales, the average score was 3.28 and 3.31, respectively. In contrast, the average medical error and adverse event safety culture scores were 1.73 and 1.71, respectively. Taken together, these findings indicate that many respondents believe that a culture of safety, not blame, exists within their workplace.

Table 16: Scale Summary Statistics

Scale	Number of Items	Mean	Standard Deviation	Range
ME 1: Information Seeking (n = 111)	2	1.52	0.5836	1 – 4
ME 2: Blame Culture (n = 109)	4	3.28	0.5823	1.75 – 4
ME 3: Safety Culture (n = 134)	6	1.73	0.6622	1 – 4
ME 4: Likelihood of Disclosing Unharmful Errors (n = 130)	3	5.22	2.8111	1 – 10
ME 5: Likelihood of Disclosing Harmful Errors (n = 131)	4	9.09	1.3016	4 – 10
ME 6: Comfort Disclosing Unharmful Errors (n = 129)	4	3.29	2.3340	1 – 10
ME 7: Comfort Disclosing Harmful Errors (n = 131)	6	4.80	2.9945	1 – 10
ME 8: Not Readily Apparent (n = 130)	5	6.92	1.9020	2 – 10
ME 9: Readily Apparent (n = 130)	5	8.69	1.5460	3.6 – 10
AE 1: Information Seeking (n = 108)	2	1.43	0.5227	1 – 3.5
AE 2: Blame Culture (n = 111)	4	3.31	0.5156	1.25 – 4
AE 3: Safety Culture (n = 134)	6	1.71	0.6040	1 – 4
AE 4: Likelihood of Disclosing (n = 133)	3	9.01	1.1828	5 – 10
AE 5: Comfort Disclosing (n = 126)	6	4.28	2.7675	1 –10
AE 6: Not Readily Apparent (n = 130)	3	8.74	1.4309	4 – 10
AE 7: Readily Apparent (n = 130)	3	9.38	1.0198	5 – 10

Notes:

The information seeking, blame culture, and safety culture scales are composed of strongly agree and strongly disagree questions (1 = strongly agree, 4 = strongly disagree).

All the questions on the likelihood scales measure the likelihood of disclosure using a 10-point scale (1 = unlikely, 10 = likely).

All the questions on the comfort scales measure comfort using a 10-point scale (1 = comfortable, 10 = uncomfortable).

All the questions on the not readily apparent and readily apparent scales measure the likelihood of disclosure on a 10-point scale (1 = unlikely, 10 = likely).

For the likelihood of disclosing unharmful and harmful errors scales, the average score was 5.22 and 9.09, respectively. This suggests that respondents are more likely to disclose harmful errors than they are to disclose unharmful errors. For the comfort disclosing unharmful and harmful errors scales, the average score was 3.29 and 4.80, respectively. Overall, this indicates that respondents are fairly comfortable disclosing errors, regardless of harm severity. Similarly, respondents reported a high likelihood of

disclosing adverse events to patients and/or their families. They are also fairly comfortable doing so.

The average scores for the not readily apparent and readily apparent medical error scales were 6.92 and 8.69, respectively. This suggests that respondents are more likely to disclose medical errors that are readily apparent to patients and/or their families than they are to disclose errors that are not readily apparent to them. Likewise, respondents are a bit more likely to disclose readily apparent adverse events compared to ones that are not readily apparent.

Combining Scale Scores

After scale scores were computed for each observation, Pearson's Correlation Coefficient was used to determine whether there was a bivariate relationship between them. Overall, there was a moderate, positive relationship between respondents' likelihood of disclosing not readily apparent and readily apparent medical errors (r = 0.62; p-value<0.05). Similarly, there was a strong, positive relationship between respondents' likelihood of disclosing not readily apparent errors and their likelihood of disclosing unharmful (r = 0.68; p-value<0.05) and harmful (r = 0.73; p-value<0.05) errors. A moderate, positive relationship was found between respondents' comfort disclosing unharmful and harmful errors (r = 0.61; p-value<0.05).

There was a strong, positive relationship between respondents' likelihood of disclosing harmful adverse events and their likelihood of disclosing not readily apparent (r = 0.88; p-value<0.05) and readily apparent (r = 0.78; p-value<0.5) adverse events. There was also a strong, positive relationship between respondents' likelihood of

disclosing not readily apparent and readily apparent adverse events (r = 0.79; p-value<0.05).

Given the correlation between scale scores, it was likely that multi-collinearity could be a problem in subsequent analyses. To avoid the problems associated with multi-collinearity, such as inflated standard errors (Studenmund, 2006), I used principal components factor analysis to determine whether respondents' scale scores could be further combined. I analyzed the results of the medical error and adverse event surveys separately. The results are presented in Table 17. They indicate that respondents' blame culture and safety culture scale scores form a bi-polar continuum and can be combined (Factor 1), but only for those who received the medical error survey. The likelihood of disclosing unharmful errors, harmful errors, not readily apparent errors, and readily apparent errors scale scores can be combined to produce a single likelihood of disclosure score (Factor 2). This score would indicate respondents' general inclination towards disclosing medical errors. The comfort disclosing harmful and unharmful errors scale scores can also be combined to produce a single comfort score (Factor 3). This score would indicate respondents' general comfort with disclosing medical errors to patients and/or their families. Thus, the 9 initial medical error scales have been combined into 4 medical error scales—Information Seeking, Organization Culture, Likelihood of Disclosure, and Comfort with Disclosure—for use in all subsequent analysis.

Table 17: Factor Analysis Results for Medical Error and Adverse Event Scale Scores

Scale	Factor 1	Factor 2	Factor 3
Medical Error Scales			
ME 2: Blame Culture	0.7664		
ME 3: Safety Culture	-0.8441		
ME 4: Likelihood of Disclosing Unharmful Errors		0.6762	
ME 5: Likelihood of Disclosing Harmful Errors		0.8732	
ME 8: Likelihood of Disclosing Not Readily Apparent Errors		0.9018	
ME 9: Likelihood of Disclosing Readily Apparent Errors		0.8444	
ME 6: Comfort Disclosing Unharmful Errors			0.9253
ME 7: Comfort Disclosing Harmful Errors			0.9043
Adverse Event Scales			
AE 4: Likelihood of Disclosing	0.9477		
AE 6: Likelihood of Disclosing Not Readily Apparent	0.9523		
AE 7: Likelihood of Disclosing Readily Apparent	0.9096		

Notes:

The factor loadings reported are from a principal components factor analysis with a varimax rotation.

With the adverse event surveys, respondents' likelihood of disclosing, likelihood of disclosing not readily apparent, and likelihood of disclosing readily apparent adverse events scale scores can be combined to produce a single disclosure score (Factor 1). It would indicate respondents' general propensity towards the disclosure of adverse events. Thus, the 7 initial adverse event scales have been reduced to 5—Information Seeking, Blame Culture, Safety Culture, Likelihood of Disclosing, and Comfort with Disclosing—for use in subsequent analysis.

Composite scale scores were computed by taking the average of the numerical values respondents provided for the items included in that particular scale. Any scale with more than 50% of items without a response was not included in the calculations. All scores were considered continuous. Table 18 displays summary statistics for the composite scales.

Table 18: Composite Scale Summary Statistics

Scale	Number of Items	Mean	Standard Deviation	Range
ME: Organizational Culture (n = 107)	10	-0.78	0.4964	-1.5 – 0.38
ME: Likelihood of Disclosing (n = 129)	17	7.47	1.5570	2.85 – 10
ME: Comfort with Disclosing (n = 129)	10	4.06	2.3983	1 – 10
AE: Likelihood of Disclosing (n = 130)	9	9.04	1.1389	5.11 – 10

Notes:

The organizational culture scale is composed of strongly agree and strongly disagree questions (1 = strongly agree, 4 = strongly disagree).

All the questions on the likelihood of disclosure scales measure the likelihood of disclosure using a 10-point scale (1 = unlikely, 10 = likely).

All the questions on the comfort scale measure comfort using a 10-point scale (1 = comfortable, 10 = uncomfortable).

For the medical error organizational culture scale, the average score was -0.78 (±0.50). The average score for the likelihood of disclosing and comfort with disclosing medical errors scales was 7.47 (±1.56) and 4.06 (±2.40), respectively. This suggests that while respondents are inclined to disclose medical errors to patients and/or their families, they are only somewhat comfortable doing so. For the likelihood of disclosing adverse events scale, the average score was 9.04 (±1.14), which suggests that physicians are inclined to disclose adverse events to patients and/or their families.

Chapter V: Relationship Between Harm Severity, Apparentness, and Disclosure

Descriptive Statistics

Table 19 summarizes the sociodemographic characteristics of physicians who returned the surveys. Most respondents were non-Hispanic (97.3%) Caucasian (88.6%) and male (69.2%). The average age of physicians is 52.4 years of age (± 10.6 years). On average, they have been practicing medicine for 21.6 years (± 11.2 years). Of particular relevance for this study is physicians experience with malpractice. Most respondents have never provided testimony as part of a malpractice lawsuit (59.1%), been named as a malpractice defendant (71.8%) or been sued by their patients (73.7%). These findings are consistent with the results of a study conducted by Jena et al. (2011) that estimates that 36% and 88% of physicians practicing in low-risk and high-risk specialties will face their first malpractice claim by the time they are 45 years old, respectively. Additionally, they estimate that 75% of physicians practicing in low-risk specialties and 99% of those practicing in high-risk specialties will have at least one malpractice claim filed against them by the time they are 65 years old. Overall, there were not any statistically significant differences in the characteristics of those who received the medical error and adverse event versions of the survey.

Table 19: Sample Demographics

	Overall	ME Groups	AE Groups	P-value
Sex				
Male	0.69	0.74	0.64	0.075
Female	0.31	0.26	0.36	
Hispanic				
Yes	0.03	0.02	0.04	0.234
No	0.97	0.98	0.96	
Race				
Caucasian	0.89	0.89	0.89	0.968
African American	0.03	0.02	0.03	0.648
American Indian/Alaskan Native	--	--	--	--
Asian/Pacific Islander	0.06	0.08	0.05	0.358
Other	0.03	0.03	0.03	0.937
Age				
34 or younger	0.04	0.03	0.06	0.501
35-44	0.23	0.19	0.27	
45-54	0.23	0.25	0.21	
55-64	0.40	0.42	0.37	
65 or older	0.10	0.11	0.09	
Practice area				
General practice#	0.34	0.31	0.37	0.289
Specialty practice^	0.66	0.69	0.63	
Number of years in practice	21.64 (11.23)	22.45 (11.07)	20.79 (11.37)	0.233
Provided testimony in a lawsuit				
Yes	0.41	0.44	0.38	0.315
No	0.59	0.56	0.62	
Named as malpractice defendant				
Yes	0.28	0.31	0.25	0.294
No	0.72	0.69	0.75	
Number of lawsuits				
Zero	0.74	0.72	0.76	0.388
One	0.17	0.16	0.17	
Two or more	0.10	0.12	0.07	

Notes:

For nominal and ordinal variables, proportions are reported.

For continuous variables, the mean is reported with the standard deviation in parentheses.

General practice includes hospitalists and practitioners of primary care, emergency, family or internal medicine

^ Specialty practice includes anesthesiology, cardiology, colon rectal surgery, critical care, dermatology, endocrinology, gastroenterology, general surgery, geriatrics, hematology, infectious disease, neonatology, nephrology, neurology, neurosurgery, obstetrics and gynecology, occupational medicine, oncology, ophthalmology, orthopedics, orthopedic surgery, otolaryngology, pain management, pathology, pediatrics, phlebology, physical medicine and rehabilitation, plastic surgery, psychiatry, radiology, sleep medicine, sports medicine, trauma care, urology, and urological surgery

The distribution of sex, race, and age in the sample was compared to the distribution of sex, race, and age of the population of Minnesota physicians for the year 2017, the year the data was collected. No statistically significant differences were found between the attributes of the sample and the population.

In the analysis, scenarios were pooled according to respondents' rating of the harm and apparentness of each of the scenarios they received. Table 20 summarizes how physicians classified each scenario, the level of harm patients sustained, how apparent what happened would be to patients and/or their families, and their likelihood of disclosure.

Overall, across scenarios, there is quite a bit of variability in physicians' perceptions of the severity of the harm patients sustained. For the childhood vaccination scenario, all physicians stated that the patient sustained little harm. In 3 and 7 of the 17 scenarios, the majority of physicians stated that the patient sustained either low or moderate harm, respectively. In the remaining scenarios, the majority of physicians stated that the patient sustained severe harm.

Across scenarios, there is quite a bit of variability in physicians' perceptions of how readily apparent what happened would be to patients and/or their families. The childhood vaccination scenario was considered the least apparent with an average apparentness score of 2.47 (±3.05). Physicians considered the prostate cancer and IV mix-up scenarios somewhat apparent to patients and/or their families with average apparentness scores of 5.44 (±3.97) and 5.63 (±4.58), respectively. In contrast, the knee replacement and foot amputation scenarios were considered the most readily apparent with average apparentness scores of 9.22 (±2.00) and 9.85(±0.70), respectively.

Physicians reported a high likelihood of disclosing what happened to patients and/or their families, regardless of the scenario presented. The childhood vaccination

scenario had the smallest, average likelihood of disclosure at 8.59 (±2.20). In contrast, the foot amputation scenarios had the largest, average likelihood of disclosure at 9.91 (±0.38), respectively. Overall, there is little variability in the likelihood of disclosure, suggesting that physicians are apt to engage in disclosure.

Table 20: Descriptive Statistics, by Scenario

	Event Type			Harm Severity				
	ME	AE	Other	Low	Moderate	Severe	Apparentness	Disclosure Likelihood
CT Scan	0.93	0.05	0.02	0.98	0.02	--	6.87 (3.34)	9.15 (2.10)
Appendectomy	0.11	0.74	0.15	0.08	0.05	0.87	7.32 (3.81)	9.36 (1.60)
GI Bleed	0.10	0.87	0.03	0.01	0.22	0.78	8.40 (2.41)	9.27 (1.65)
Allergic Reaction	--	0.93	0.07	0.98	0.02	--	8.14 (2.94)	9.91 (0.47)
Retained Sponge	0.68	0.30	0.02	0.20	0.70	0.09	8.64 (2.69)	9.57 (1.90)
Prostate Cancer	0.79	0.19	0.02	0.05	0.07	0.88	5.44 (3.97)	9.33 (2.00)
Breast Biopsies	0.84	0.16	--	0.26	0.52	0.22	4.35 (4.22)	9.74 (0.85)
Foot Amputation	0.94	0.06	--	--	0.06	0.94	9.85 (0.70)	9.91 (0.38)
Shunt Revision	0.02	0.89	0.09	0.19	0.58	0.23	7.16 (3.02)	9.14 (2.08)
IV Infiltration	0.11	0.83	0.06	0.68	0.29	0.02	8.73 (1.76)	9.44 (0.94)
IV Mix-up	0.88	0.11	0.02	--	--	1.00	5.63 (4.58)	9.79 (0.88)
Hearing Loss	0.73	0.24	0.02	0.05	0.48	0.48	7.31 (3.09)	9.09 (1.36)
Knee Replacement	0.65	0.35	--	0.20	0.37	0.43	9.22 (2.00)	9.67 (1.33)
Birth Control	--	0.97	0.27	0.14	0.57	0.30	8.00 (2.41)	9.08 (2.09)
Breast Cancer	0.03	0.91	0.06	0.45	0.55	--	7.30 (3.45)	8.97 (2.38)
Leukemia	0.02	0.88	0.09	0.54	0.41	0.05	7.92 (3.10)	8.97 (2.34)

Childhood Vaccination	0.64	0.21	0.15	1.00	--	--	2.47 (3.05)	8.59 (2.20)

Notes:

For event type and harm severity, proportions are reported.

For apparentness and disclosure, the mean is reported with the standard deviation in parenthesis.

The Relationship Between Harm Severity, Apparentness, and Disclosure

Table 21 summarizes the association between harm severity and disclosure separately for medical errors and adverse events. When medical errors occur, most physicians reported that they are likely to disclose them to patients and/or their families. Approximately 19% of the variation in physicians' likelihood of disclosing medical errors can be explained by the variation in harm severity (Somers' D = 0.1851; p-value < 0.05). Alternatively, for adverse events, there is not a statistically significant relationship between harm severity and disclosure (Somers' D = 0.0673; p-value = 0.372).

Table 21: The Association Between Harm Severity and Disclosure

	Likelihood of Disclosure			
	Unlikely	Somewhat Likely	Likely	P-value
Medical Errors				
Low Harm	8 (6.20)	8 (6.20)	113 (87.60)	0.004*
Moderate Harm	2 (2.53)	12 (15.19)	65 (82.28)	
Severe Harm	3 (1.24)	13 (5.39)	225 (93.36)	
Adverse Events				
Low Harm	7 (4.83)	18 (12.41)	120 (82.76)	0.668
Moderate Harm	5 (3.09)	14 (8.64)	143 (88.27)	
Severe Harm	6 (2.90)	21 (10.14)	180 (86.96)	

Note:

Row percentages shown in parenthesis

* denotes p-value < 0.05

Turning to apparentness, Table 22 summarizes the association between apparentness and disclosure separately for medical errors and adverse events. For medical errors, 42.48% of the variation in willingness to disclose is associated with how apparent the error is to patients and/or their families (Somers' D = 0.4248; p-value < 0.001). However, for adverse events, the effect of apparentness is stronger. Specifically, 52.15% of the variation in physicians' likelihood of disclosing adverse events can be explained by the variation in how readily apparent the events are to patients and/or their families (Somers' D = 0.5215; p-value < 0.001).

Table 22: The Association Between Apparentness and Disclosure

	Likelihood of Disclosure			
	Unlikely	Somewhat Likely	Likely	P-value
Medical Errors				
Not Readily Apparent	10 (7.52)	16 (12.03)	107 (80.45)	<0.001*
Somewhat Apparent	2 (1.98)	12 (11.88)	87 (86.14)	
Readily Apparent	1 (0.47)	5 (2.34)	208 (97.20)	
Adverse Events				
Not Readily Apparent	7 (8.43)	22 (26.51)	54 (65.06)	<0.001*
Somewhat Apparent	6 (3.39)	30 (16.95)	141 (79.66)	
Readily Apparent	5 (1.98)	1 (0.40)	247 (97.63)	

Note:

Row percentages shown in parenthesis

* denotes p-value < 0.05

Table 23 displays the coefficients from the probit and ordered probit regression analyses of the medical error data only. Tables 24 and 25 display the predicted probabilities of disclosing not readily apparent, somewhat apparent, and readily apparent medical errors that were estimated using the probit and ordered probit models,

respectively. Based on probit Models I and II, there is a statistically significant relationship between apparentness and physicians' likelihood of engaging in disclosure. The probability of being highly likely to disclose is 0.7191 (p-value < 0.001) and 0.7182 (p-value < 0.001) for somewhat apparent medical errors, respectively. In contrast, the probability of being highly likely to disclose is 0.9512 (p-value < 0.001) and 0.9477 (p-value < 0.001) for medical errors that are readily apparent to patients and/or their families, respectively. Across both probit model specifications, the predict probabilities are quite similar.

Based on both ordered probit models, there is also a statistically significant relationship between apparentness and disclosure. Based on model I, the probability of being unlikely to disclose what happened is 0.0739 (p-value = 0.012) and 0.0527 (p-value = 0.045) for not readily apparent and somewhat readily apparent errors, respectively. For readily apparent errors, the probability is 0.0042; however, it is not statistically significant. The probability of being somewhat likely to disclose is 0.2643 (p-value < 0.001) and 0.2247 (p-value < 0.001) for not readily apparent and somewhat readily apparent errors, respectively. For readily apparent errors, the probability is 0.0487 (p-value = 0.009). The probability of being highly likely to disclose what happened is 0.6618, 0.7226, and 0.9471 for not readily apparent, somewhat readily apparent, and readily apparent errors, respectively (p-values < 0.001). The results of Model II are similar to those from Model I.

Table 23: Predictors of the Likelihood of Disclosing Medical Errors

	Probit				Ordered Probit			
	Model I		Model II		Model I		Model II	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
Harm Severity[#]								
Moderate Harm	0.1160 (0.3470)	0.738	0.0678 (0.7502)	0.928	0.2624 (0.2875)	0.361	0.4874 (0.5230)	0.351
Severe Harm	-0.0593 (0.3902)	0.879	0.9520 (0.3471)	0.006*	-0.0181 (0.4338)	0.967	5.9033 (0.5844)	<0.001*
Apparentness[^]								
Somewhat Apparent	0.2131 (0.2926)	0.466	0.3675 (0.3059)	0.230	0.2230 (0.2747)	0.417	0.3972 (0.3038)	0.191
Readily Apparent	1.5314 (0.3268)	<0.001*	1.7294 (0.3675)	<0.001*	1.5436 (0.3101)	<0.001*	1.7793 (0.3708)	<0.001*
Harm Severity x Malpractice Risk								
Moderate Harm x Unlikely			-0.1900 (0.9546)	0.842			-0.4816 (0.7431)	0.517
Moderate Harm x Likely			0.7831 (1.0310)	0.448			-6.6335 (1.0662)	<0.001*
Moderate Harm x Very Likely			--				6.1927 (0.8467)	<0.001*
Severe Harm x Unlikely			-2.4234 (0.6562)	<0.001*			-7.7372 (0.7547)	<0.001*
Severe Harm x Likely			--				-11.8784 (0.9273)	<0.001*
Severe Harm x Very Likely			--				-4.9088 (0.6935)	<0.001*
Malpractice Risk[+]								
Very Likely	0.3921 (0.4489)	0.382	-0.4859 (0.4549)	0.285	0.3978 (0.4437)	0.370	-0.4401 (0.3573)	0.218
Likely	-0.0090 (0.4613)	0.984	-1.0307 (0.6651)	0.121	-0.0444 (0.4784)	0.926	5.9729 (0.7026)	<0.001*
Unlikely	0.3784 (0.3712)	0.308	0.7533 (0.4616)	0.103	0.4164 (0.3401)	0.221	0.9177 (0.4412)	0.038*
Scales								
Information Seeking	-0.4961	0.041*	-0.4862	0.051	-0.4859	0.020*	-0.4931	0.023*

	(0.2429)		(0.2495)		(0.2086)		(0.2176)	
Organizational Culture	-0.6379 (0.3899)	0.102	-0.7244 (0.4189)	0.084	-0.5958 (0.3572)	0.095	-0.7630 (0.3934)	0.052
Likelihood of Disclosure	-0.0016 (0.1018)	0.988	0.0155 (0.1068)	0.885	0.0685 (0.1005)	0.495	0.0900 (0.1050)	0.391
Comfort with Disclosure	-0.1540 (0.0740)	0.037*	-0.2222 (0.0786)	0.005*	-0.1668 (0.0760)	0.028*	-0.2378 (0.0791)	0.003*
Physician Attributes								
Age[^^]								
40 - 49	0.4677 (0.5700)	0.412	0.2533 (0.6221)	0.684	0.3903 (0.5276)	0.459	0.1314 (0.5941)	0.825
50 - 59	-0.6236 (0.8094)	0.441	-0.8774 (0.8679)	0.312	-1.0947 (0.7561)	0.148	-1.4394 (0.8510)	0.091
60 or older	0.0187 (0.8389)	0.982	-0.0348 (0.8951)	0.969	-0.4147 (0.7983)	0.603	-0.5014 (0.8873)	0.572
Male								
Yes	0.3376 (0.3612)	0.350	0.3880 (0.3817)	0.309	0.4168 (0.3234)	0.198	0.5414 (0.3525)	0.125
White[##]								
Yes	0.3754 (0.4454)	0.399	0.3266 (0.4739)	0.491	0.1332 (0.4360)	0.760	0.0564 (0.4866)	0.908
Hispanic								
Yes	--		--		1.7798 (0.8640)	0.039*	1.5238 (0.9781)	0.119
Specialist								
Yes	-0.0801 (0.3473)	0.818	-0.0361 (0.3409)	0.916	-0.3118 (0.3499)	0.373	-0.3073 (0.3503)	0.380
Years in Practice[++]								
6 - 10	-0.2607 (0.6743)	0.699	-0.0269 (0.6492)	0.967	-0.2368 (0.5518)	0.668	0.0654 (0.5880)	0.911
11 - 19	0.4773 (0.8334)	0.567	0.7737 (0.8840)	0.381	0.6645 (0.7726)	0.390	1.1098 (0.8588)	0.196
20 - 29	1.3235 (1.0215)	0.195	1.7112 (1.0756)	0.112	1.9954 (0.9856)	0.043*	2.5834 (1.0979)	0.019*
30 - 39	0.9452 (1.0278)	0.358	1.3080 (1.0714)	0.222	1.4612 (0.9687)	0.131	1.9955 (1.0523)	0.058
40 or more	0.4071 (1.1810)	0.730	0.5227 (1.2443)	0.674	1.0286 (1.1454)	0.369	1.2016 (1.2189)	0.324
Ever Sued for Malpractice								

Yes	-0.2268 (0.4131)	0.583	-0.4285 (0.4314)	0.321	-0.1458 (0.4033)	0.718	-0.3034 (0.4296)	0.480
Pseudo R^2	0.2975		0.3441		0.2838		0.3526	
Number of observations	190		181		192		192	

Notes:

Standard errors have been adjusted for clustering at the physician level and are shown in parentheses.

* p-value < 0.05

The reference group is low harm.

^ The reference group is not readily apparent.

+ The reference group is very unlikely.

^^ The reference group is 30 – 39 years of age.

The reference group is non-white.

++ The reference group is 1 – 5 years in practice.

Generalist practice areas: Emergency Medicine, Family Medicine, and Internal Medicine

Specialist practice areas: Allergy and Immunology, Anesthesiology, Dermatology, Medical Genetics and Genomics, Neurological Surgery, Neuromusculoskeletal Medicine, Nuclear Medicine, Obstetrics and Gynecology, Ophthalmology, Ophthalmology and Otolaryngology, Orthopedic Surgery, Otolaryngology, Pathology, Pediatrics, Physical Medicine and Rehabilitation, Plastic Surgery, Preventative Medicine, Psychiatry and Neurology, Radiology, Surgery, Thoracic Surgery, and Urology

Table 24: The Predicted Probability of Disclosing Not Readily Apparent, Somewhat Apparent, and Readily Apparent Medical Errors (Probit Models Only)

	Model I		Model II	
	Highly Likely to Disclose		Highly Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value
Not Readily Apparent	0.6580 (0.0551)	<0.001*	0.6182 (0.0552)	<0.001*
Somewhat Apparent	0.7191 (0.0667)	<0.001*	0.7182 (0.0645)	<0.001*
Readily Apparent	0.9512 (0.0213)	<0.001*	0.9477 (0.0224)	<0.001*

Notes:

Standard errors in parentheses.

*p-value < 0.05

Table 25: The Predicted Probability of Disclosing Not Readily Apparent, Somewhat Apparent, and Readily Apparent Medical Errors (Ordered Probit Models Only)

	Model I					
	Not Likely to Disclose		Somewhat Likely to Disclose		Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value
Not Readily Apparent	0.0739 (0.0295)	0.012*	0.2643 (0.0463)	<0.001*	0.6619 (0.0511)	<0.001*
Somewhat Apparent	0.0527 (0.0263)	0.045*	0.2247 (0.0500)	<0.001*	0.7226 (0.0618)	<0.001*
Readily Apparent	0.0042 (0.0036)	0.248	0.0487 (0.0188)	0.009*	0.9471 (0.0213)	<0.001*
	Model II					
	Not Likely to Disclose		Somewhat Likely to Disclose		Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value
Not Readily Apparent	0.0792 (0.0281)	0.005*	0.2813 (0.0450)	<0.001*	0.6395 (0.0481)	<0.001*
Somewhat Apparent	0.0455 (0.0217)	0.036*	0.2199 (0.0482)	<0.001*	0.7346 (0.0579)	<0.001*
Readily Apparent	0.0037 (0.0034)	0.279	0.0522 (0.0194)	0.007*	0.9442 (0.0217)	<0.001*

Notes:

Standard errors in parentheses.

*p-value < 0.05

Table 26 and 27 display the predicted probability of disclosing medical errors by harm severity and malpractice risk for the probit and ordered probit models, respectively. Based on probit Model I, there is a statistically significant relationship between harm severity and disclosure. The probability of being highly likely to disclose medical errors that cause low or moderate harm is 0.8102 and 0.8316, (p-values <0.001) respectively. For severe harm, the probability is 0.7986 (p-value < 0.001). Similarly, there is a statistically significant relationship between malpractice risk and disclosure. For medical errors that are unlikely or very unlikely to result in a malpractice lawsuit if disclosed, the probability that physicians will be highly likely to disclose it is 0.7639 and 0.8386 (p-

values < 0.001), respectively. For errors that are likely or very likely to result in a malpractice lawsuit, the probabilities are is 0.7619 and 0.8410 (p-values < 0.001), respectively.

When an interaction term for harm severity and malpractice risk is added to probit Model I, the results are statistically significant, indicating that physicians' willingness to disclose medical errors varies based on the severity of the harm patients sustain and their perceived likelihood that what happened will result in a malpractice lawsuit. When patients sustain little to no harm and physicians believe that a lawsuit is very unlikely or unlikely, the probability that they will be highly likely to disclose it is 0.6984 and 0.8837 (p-values < 0.001), respectively. When the risk of a lawsuit is highly likely, the probability decreases to 0.6315 (p-value < 0.001). If patients sustain severe harm and physicians perceive their malpractice risk as unlikely or very likely, the probability that they will be highly likely to disclose what happened is 0.5783 and 0.8396 (p-values < 0.001), respectively.

The results of ordered probit Model I suggests that regardless of harm severity the probability that physicians will be highly likely to disclose is greater than or equal to 0.8000. Similarly, the probability that physicians will be highly likely to disclose is quite high, regardless of their perceived malpractice risk. Conversely, they are less likely to report that they would be unlikely or somewhat likely to disclose what happened.

When interaction terms for the relationship between harm severity and malpractice risk are added to the ordered probit model, their estimated probabilities are statistically significant. Physicians' willingness to disclose harmful errors varies depending on their perceived malpractice risk. For instance, when patients sustain severe

harm and a malpractice lawsuit is highly unlikely or unlikely the probability of disclosure is 0.9999 and 0.5232 (p-values < 0.001), respectively. When a malpractice lawsuit is likely or highly likely, the probability of being highly likely to disclose is 0.7303 and 0.8337 (p-values < 0.001), respectively. Overall, following medical errors that cause low, moderate, or severe harm, physicians are highly likely to disclose what happened, regardless of their perceived malpractice risk.

Table 26: The Predicted Probability of Disclosing Medical Errors, By Harm Severity and Malpractice Risk (Probit Models Only)

	Model I		Model II	
	Pr(Y)	P-value	Pr(Y)	P-value
Harm Severity				
Low Harm	0.8102 (0.0500)	<0.001*		
Moderate Harm	0.8316 (0.0521)	<0.001*		
Severe Harm	0.7986 (0.0484)	<0.001*		
Malpractice Risk				
Very Unlikely	0.7639 (0.0595)	<0.001*		
Unlikely	0.8386 (0.0550)	<0.001*		
Likely	0.7619 (0.0769)	<0.001*		
Very Likely	0.8410 (0.0533)	<0.001*		
Harm Severity & Malpractice Risk				
Low Harm				
Very Unlikely			0.6984 (0.0307)	<0.001*
Unlikely			0.8837 (0.0556)	<0.001*
Likely			not estimable	
Very Likely			0.6315 (0.0771)	<0.001*

Moderate Harm			
Very Unlikely		0.7145 (0.0801)	<0.001*
Unlikely		0.8661 (0.0483)	<0.001*
Likely		0.7510 (0.0733)	<0.001*
Very Likely		not estimable	
Severe Harm			
Very Unlikely		not estimable	
Unlikely		0.5783 (0.1317)	<0.001*
Likely		0.7717 (0.0659)	<0.001*
Very Likely		0.8396 (0.0344)	<0.001*

Notes:

*p-value < 0.05

Table 27: The Predicted Probability of Disclosing Medical Errors, By Harm Severity and Malpractice Risk (Ordered Probit Models Only)

	Model I					
	Not Likely to Disclose		Somewhat Likely to Disclose		Highly Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value
Harm Severity						
Low Harm	0.0382	0.057	0.1607	<0.001*	0.8011	<0.001*
	(0.0201)		(0.0382)		(0.0503)	
Moderate Harm	0.0252	0.091	0.1273	<0.001*	0.8476	<0.001*
	(0.0149)		(0.0349)		(0.0445)	
Severe Harm	0.0393	0.045*	0.1631	<0.001*	0.7976	<0.001*
	(0.0196)		(0.0419)		(0.0535)	
Malpractice Risk						
Very Unlikely	0.0498	0.038*	0.1864	<0.001*	0.7638	<0.001*
	(0.0240)		(0.0444)		(0.0579)	
Unlikely	0.0262	0.081	0.1308	0.003*	0.8430	<0.001*
	(0.0150)		(0.0438)		(0.0536)	
Likely	0.0531	0.135	0.1926	<0.001*	0.7544	<0.001*
	(0.0355)		(0.0501)		(0.0774)	
Very Likely	0.0270	0.090	0.1332	0.001*	0.8398	<0.001*
	(0.0159)		(0.0411)		(0.0514)	
	Model II					
	Not Likely to Disclose		Somewhat Likely to Disclose		Highly Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value
Harm Severity & Malpractice Risk Low Harm						
Very Unlikely	0.0546	0.022*	0.2146	<0.001*	0.7308	<0.001*
	(0.0239)		(0.0400)		(0.0522)	
Unlikely	0.0140	0.182	0.1000	0.008*	0.8860	<0.001*
	(0.0105)		(0.0377)		(0.0457)	
Likely	$1.03e^{-9}$	0.773	$1.25e^{-6}$	0.676	$1.00e^{0}$	<0.001*
	$(3.57e^{-9})$		$(2.99e^{-6})$		$(3.00e^{-6})$	
Very Likely	0.0946	0.022*	0.2712	<0.001*	0.6342	<0.001*
	(0.0414)		(0.0506)		(0.0756)	
Moderate Harm						
Very Unlikely	0.0275	0.193	0.1499	0.013*	0.8227	<0.001*
	(0.0211)		(0.0603)		(0.0777)	
Unlikely	0.0139	0.080	0.0994	0.002*	0.8867	<0.001*
	(0.0079)		(0.0320)		(0.0367)	
Likely	0.0683	0.181	0.2377	<0.001*	0.6939	<0.001*

	(0.0511)		(0.0642)		(0.1076)	
Very Likely	$2.37e^{-10}$	0.787	$4.19e^{-7}$	0.700	1.0000	<0.001*
	$(8.78e^{-10})$		$(1.09e^{-6})$		$(1.09e^{-6})$	
Severe Harm						
Very Unlikely	$1.49e^{-9}$	0.826	$1.65e^{-6}$	0.766	1.0000	<0.001*
	$(6.87e^{-9})$		$(5.53e^{-6})$		(0.0000)	
Unlikely	0.1581	0.079	0.3187	<0.001*	0.5232	<0.001*
	(0.0899)		(0.0614)		(0.1306)	
Likely	0.0548	0.139	0.2149	0.001*	0.7303	<0.001*
	(0.0370)		(0.0653)		(0.9546)	
Very Likely	0.0248	0.015*	0.1415	<0.001*	0.8337	<0.001*
	(0.0102)		(0.0375)		(0.0418)	

Notes:

*p-value < 0.05

Table 28 displays the coefficients from the probit and ordered probit regression analyses performed on the adverse event data only. Tables 29 and 30 display the predicted probabilities for apparentness for each outcome category estimated using the probit and ordered probit regression models, respectively. Across all model specifications, the probability that physicians will be highly likely to disclose readily apparent adverse events is approximately 0.9300 (p -value < 0.001).

Table 28: Predictors of the Likelihood of Disclosing Adverse Events

	Probit				Ordered Probit			
	Model I		Model II		Model I		Model II	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
Harm Severity[#]								
Moderate Harm	-0.5828 (0.3226)	0.071	-0.8304 (0.5024)	0.098	-0.5324 (0.2847)	0.061	-0.7128 (0.4760)	0.134
Severe Harm	-0.0100 (0.3754)	0.979	-0.1505 (0.5388)	0.780	0.0778 (0.3398)	0.819	4.5760 (0.4723)	<0.001*
Apparentness[^]								
Somewhat Apparent	0.2907 (0.3752)	0.439	0.0926 (0.3823)	0.809	0.2509 (0.3264)	0.442	0.1137 (0.3270)	0.728
Readily Apparent	1.7153 (0.4021)	<0.001*	1.6238 (0.3998)	<0.001*	1.5372 (0.3283)	<0.001*	1.5402 (0.3533)	<0.001*
Harm Severity & Malpractice Risk								
Moderate Harm x Unlikely			0.6956 (0.7760)	0.370			0.5204 (0.6459)	0.420
Moderate Harm x Likely			-1.0761 (1.0575)	0.309*			2.9455 (1.0112)	0.004*
Moderate Harm x Very Likely			-1.2821 (1.5900)	0.420			-6.3903 (1.1494)	<0.001*
Severe Harm x Unlikely			--				-4.7755 (0.6080)	<0.001*
Severe Harm x Likely			--				--	
Severe Harm x Very Likely			--				-9.7071 (0.6804)	<0.001*
Malpractice Risk[+]								
Very Likely	-1.6257 (0.7275)	0.025*	-1.1456 (1.1324)	0.312	-1.2067 (0.6210)	0.052	4.2799 (0.6613)	<0.001*
Likely	0.0254 (0.4659)	0.957	0.3001 (0.7483)	0.688	-0.0936 (0.4376)	0.831	-4.3296 (0.5195)	<0.001*
Unlikely	-0.2742 (0.2970)	0.356	-0.4266 (0.6144)	0.488	-0.2790 (0.2628)	0.288	-0.3010 (0.4884)	0.538
Scales								
Information Seeking	0.2406 (0.2920)	0.410	0.2190 (0.2891)	0.314	0.0484 (0.2377)	0.839	0.0509 (0.2399)	0.832
Safety Culture	0.0431 (0.2030)	0.832	0.1509 (0.2070)	0.466	-0.0760 (0.1957)	0.698	0.0566 (0.1976)	0.775
Blame Culture	0.3048	0.258	0.3935	0.165	0.2914	0.252	0.3437	0.189

	(0.2692)		(0.2834)		(0.2546)		(0.2617)	
Likelihood of Disclosure	0.3773 (0.1213)	0.002*	0.4375 (0.1251)	0.001*	0.3494 (0.1132)	0.002*	0.4209 (0.1195)	0.001*
Comfort with Disclosure	-0.0117 (0.0538)	0.828	-0.0157 (0.0556)	0.777	0.0192 (0.0512)	0.708	0.0195 (0.0534)	0.715
Physician Attributes								
Age[^^]								
40 - 49	0.3514 (0.6623)	0.596	0.2576 (0.6351)	0.685	0.4077 (0.6340)	0.520	0.2810 (0.6024)	0.641
50 - 59	0.1651 (0.8673)	0.849	0.0845 (0.8069)	0.917	0.6855 (0.7750)	0.376	0.5999 (0.7152)	0.402
60 or older	-0.4737 (0.9192)	0.606	-0.6611 (0.8792)	0.452	0.2914 (0.8059)	0.718	0.0878 (0.7585)	0.908
Male								
Yes	0.1462 (0.3413)	0.668	0.1190 (0.3586)	0.740	-0.0354 (0.3100)	0.909	-0.0677 (0.3378)	0.841
White[##]								
Yes	-0.3487 (0.3541)	0.325	-0.4073 (0.3451)	0.238	-0.7224 (0.3338)	0.030*	-0.7105 (0.3170)	0.025*
Hispanic								
Yes	--		--		4.5673 (0.7375)	<0.001*	4.8332 (0.7457)	<0.001*
Specialist								
Yes	-0.4913 (0.3535)	0.165	-0.3996 (0.3699)	0.280	-0.3988 (0.3140)	0.204	-0.3446 (0.3247)	0.289
Years in Practice[++]								
6 - 10	0.8039 (0.6712)	0.231	0.7231 (0.6480)	0.264	0.8024 (0.6286)	0.202	0.7816 (0.6315)	0.216
11 - 19	0.5471 (0.7015)	0.435	0.5856 (0.6935)	0.398	0.3634 (0.6661)	0.585	0.4487 (0.6573)	0.495
20 - 29	1.1217 (0.9129)	0.219	1.2597 (0.8789)	0.152	0.4698 (0.8158)	0.565	0.6627 (0.7770)	0.394
30 - 39	0.4632 (0.9600)	0.629	0.4597 (0.9062)	0.612	-0.1440 (0.8401)	0.864	-0.0950 (0.7962)	0.905
40 or more	0.8522 (0.8744)	0.330	1.0727 (0.8475)	0.206	0.3779 (0.8153)	0.643	0.6286 (0.7983)	0.431
Ever Sued for Malpractice								
Yes	0.5150 (0.3820)	0.178	0.5943 (0.3940)	0.131	0.2631 (0.3765)	0.485	0.3550 (0.4072)	0.383
Pseudo R^2	0.3518		0.3739		0.2761		0.3200	

Number of observations	221	208	226	226

Notes:

Standard errors have been adjusted for clustering at the physician level and are shown in parentheses.

* p-value < 0.05

The reference group is low harm.

^ The reference group is not readily apparent.

+ The reference group is very unlikely.

^^ The reference group is 30 – 39 years of age.

The reference group is non-white.

++ The reference group is 1 – 5 years in practice.

Generalist practice areas: Emergency Medicine, Family Medicine, and Internal Medicine

Specialist practice areas: Allergy and Immunology, Anesthesiology, Dermatology, Medical Genetics and Genomics, Neurological Surgery, Neuromusculoskeletal Medicine, Nuclear Medicine, Obstetrics and Gynecology, Ophthalmology, Ophthalmology and Otolaryngology, Orthopedic Surgery, Otolaryngology, Pathology, Pediatrics, Physical Medicine and Rehabilitation, Plastic Surgery, Preventative Medicine, Psychiatry and Neurology, Radiology, Surgery, Thoracic Surgery, and Urology

Table 29: The Predicted Probability of Disclosing Adverse Events (Probit Models Only)

	Model I		Model II	
	Highly Likely to Disclose		Highly Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value
Apparentness				
Not Readily Apparent	0.5881 (0.0992)	<0.001*	0.6225 (0.0944)	<0.001*
Somewhat Apparent	0.6716 (0.0406)	<0.001*	0.6476 (0.0408)	<0.001*
Readily Apparent	0.9338 (0.0190)	<0.001*	0.9307 (0.0192)	<0.001*

Notes:

Standard errors in parentheses.

*p-value < 0.05

Table 30: The Predicted Probability of Disclosing Adverse Events (Ordered Probit Models Only)

	Model I					
	Not Likely to Disclose		Somewhat Likely to Disclose		Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value
Apparentness						
Not Readily Apparent	0.0824 (0.0457)	0.071	0.3097 (0.0589)	<0.001*	0.6079 (0.0904)	<0.001*
Somewhat Apparent	0.0558 (0.0177)	0.002*	0.2615 (0.0421)	<0.001*	0.6827 (0.0435)	<0.001*
Readily Apparent	0.0042 (0.0028)	0.134	0.0615 (0.0175)	<0.001*	0.9343 (0.0193)	<0.001*
	Model II					
	Not Likely to Disclose		Somewhat Likely to Disclose		Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value
Apparentness						
Not Readily Apparent	0.0722 (0.0388)	0.062	0.2816 (0.0547)	<0.001*	0.6461 (0.0816)	<0.001*
Somewhat Apparent	0.0611 (0.0187)	0.001*	0.2625 (0.0387)	<0.001*	0.6764 (0.0402)	<0.001*
Readily Apparent	0.0038 (0.0026)	0.141	0.0611 (0.0169)	<0.001*	0.9351 (0.0186)	<0.001*

Notes:

Standard errors in parentheses.

*p-value < 0.05

As with the disclosure of medical errors, physicians' probability of disclosing harmful adverse events varies, depending on their perceived likelihood of being sued for malpractice following disclosure (see Tables 31 and 32). The estimated probabilities for these interaction effects are not very similar across models for low or moderate harm events. For instance, based on probit Model II, the probability of physicians being highly likely to disclose adverse events that cause patients low harm is 0.8530 and 0.7791 if they perceive their malpractice risk as very unlikely or unlikely, respectively (p-values < 0.001). Based on ordered probit Model II, these probabilities are less than 0.0001.

However, the result is not statistically significant for low harm events that physicians believe are not very likely to result in a lawsuit.

In contrast, the probabilities for the interaction effects are similar across models for adverse events that cause severe harm. For example, based on probit Model II, following adverse events that cause patients severe harm, the probability that physicians will be highly likely to disclose is 0.8735 and 0.5786, given a perceived malpractice risk of likely and very likely, respectively (p-values < 0.001). Based on the ordered probit model, these probabilities are 0.8908 and 0.6805, respectively (p-values < 0.001).

Table 31: The Predicted Probability of Disclosing Adverse Events, By Harm Severity and Malpractice Risk (Probit Models Only)

	Model I		Model II	
	Highly Likely to Disclose		Highly Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value
Harm Severity				
Low Harm	0.8173 (0.0476)	<0.001*		
Moderate Harm	0.6990 (0.0420)	<0.001*		
Severe Harm	0.8156 (0.0345)	<0.001*		
Malpractice Risk				
Very Unlikely	0.8191 (0.0430)	<0.001*		
Unlikely	0.7671 (0.0316)	<0.001*		
Likely	0.8236 (0.0617)	<0.001*		
Very Likely	0.4433 (0.1607)	0.006*		
Harm Severity & Malpractice Risk				
Low Harm				
Very Unlikely			0.8530 (0.0310)	<0.001*
Unlikely			0.7791 (0.0930)	<0.001*
Likely			not estimable	
Very Likely			not estimable	
Moderate Harm				
Very Unlikely			0.6976 (0.0529)	<0.001*
Unlikely			0.7528 (0.0464)	<0.001*
Likely			0.5143 (0.1501)	0.001*
Very Likely			0.1517 (0.1044)	0.146

Severe Harm			
Very Unlikely		not estimable	
Unlikely		0.7497 (0.0424)	<0.001*
Likely		0.8735 (0.0498)	<0.001*
Very Likely		0.5786 (0.1395)	<0.001*

Notes:

Standard errors are shown in parentheses.

* p-value < 0.05

Table 32: The Predicted Probability of Disclosing Adverse Events, By Harm Severity and Malpractice Risk (Ordered Probit Models Only)

	Model I						Model II					
	Not Likely to Disclose		Somewhat Likely to Disclose		Highly Likely to Disclose		Not Likely to Disclose		Somewhat Likely to Disclose		Highly Likely to Disclose	
	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value	Pr(Y)	P-value
Harm Severity												
Low Harm	0.0270 (0.0143)	0.059	0.1560 (0.0358)	<0.001*	0.8170 (0.0449)	<0.001*						
Moderate Harm	0.0632 (0.0235)	0.007*	0.2356 (0.0356)	<0.001*	0.7012 (0.0444)	<0.001*						
Severe Harm	0.0235 (0.0096)	0.014*	0.1451 (0.0315)	<0.001*	0.8314 (0.0353)	<0.001*						
Malpractice Risk												
Very Unlikely	0.0231 (0.0127)	0.069	0.1474 (0.0332)	<0.001*	0.8295 (0.0408)	<0.001*						
Unlikely	0.0377 (0.0147)	0.010*	0.1882 (0.0275)	<0.001*	0.7741 (0.0308)	<0.001*						
Likely	0.0274 (0.0190)	0.0148	0.1607 (0.0523)	0.002*	0.8119 (0.0671)	<0.001*						
Very Likely	0.1392 (0.0784)	0.076	0.3181 (0.0775)	<0.001*	0.5427 (0.1431)	<0.001*						
Harm Severity & Malpractice Risk												
Low Harm												
Very Unlikely							0.0163 (0.0125)	0.194	0.0549 (0.0325)	0.091	$5.70e^{-10}$ ($1.63e^{-9}$)	0.727
Unlikely							0.0283 (0.0193)	0.142	0.0390 (0.0185)	0.035*	0.0395 (0.0181)	0.029*

Likely				not estimable		0.2678 (0.1775)	0.131	0.0099 (0.0068)	0.141
Very Likely				$3.02e^{-9}$ ($8.78e^{-9}$)	0.731	0.4479 (0.2312)	0.053	0.0671 (0.0518)	0.195
Moderate Harm									
Very Unlikely				0.1292 (0.0399)	0.001*	0.2319 (0.0599)	<0.001*	$1.01e^{-6}$ ($1.91e^{-6}$)	0.598
Unlikely				0.1706 (0.0566)	0.003*	0.1990 (0.0344)	<0.001*	0.2000 (0.0358)	<0.001*
Likely				not estimable		0.3715 (0.0515)	<0.001*	0.0992 (0.0367)	0.007*
Very Likely				$3.60e^{-6}$ ($7.54e^{-6}$)	0.633	0.3492 (0.0782)	<0.001*	0.2524 (0.1057)	0.017*
Severe Harm									
Very Unlikely				0.8545 (0.0498)	<0.001*	0.7132 (0.0845)	<0.001*	1.0000 ($1.92e^{-6}$)	<0.001*
Unlikely				0.8011 (0.0716)	<0.001*	0.7620 (0.0439)	<0.001*	0.7605 (0.0447)	<0.001*
Likely				not estimable		0.3607 (0.1888)	0.056	0.8908 (0.0415)	<0.001*
Very Likely				$1.00e^{0}$ ($7.55e^{-6}$)	<0.001*	0.2029 (0.1687)	0.229	0.6805 (0.1532)	<0.001*

Notes:

Standard errors in parentheses.

*p-value < 0.05

Chapter VI: Discussion

The purpose of this dissertation is to explore the relationship between harm severity, apparentness, and physicians' willingness to disclose medical errors and adverse events to patients and/or their families. A literature review conducted by Kaldjian, Jones, Rosenthal, Tripp-Reimer, and Hillis (2006) suggests that physicians' malpractice concerns could either encourage or discourage disclosure. If physicians believe that disclosure reduces their malpractice risk, then they may be more apt to disclose what happened. From a financial and legal perspective, disclosure may be in their best interest, given that prior research suggests that some individuals sue for malpractice in an effort to find out what happened to them or a loved one (Hickson et al., 1992; Vincent et al., 1994; Witman et al., 1996; Schwappach & Koeck, 2004).

When dealing with disclosure and malpractice, physicians are presented with a Catch-22 at best and a Faustian bargain at worst. The American Medical Association's (AMA) Code of Medical Ethics calls physicians to be "honest in all professional interactions" (American Medical Association, 2016, pg. 1). This ethical statement falls somewhere between a moral value and an enforceable law. It is a behavioral standard that all physicians are expected to strive to achieve. As such, it does not carry the threat of civil or criminal litigation. In contrast, acts of malpractice are accompanied by the threat of civil litigation. In the wake of truly horrendous acts, like the intentional killing of patients under their care (Getlen, 2018), it may also carry the threat of criminal prosecution, incarceration and, in some states, the death penalty.

Faced with the possibility of being sued for malpractice, physicians may be tempted to violate the AMA's ethical stance on honesty and forgo disclosure following

harmful medical errors in hopes that patients and/or their families will not find out what happened. They would not want to do or say anything that patients and/or their families could use against them in court (Bell et al., 2012). If no one discovers the truth, then physicians may be able to avoid the personal and professional costs of malpractice. But, prior research suggests that physicians involved in malpractice litigation may experience numerous forms of psychological and physiological distress, like anger, insomnia, diminished self-esteem, and fear of reputational harm, just to name a few (Charles et al., 1988; Charles, 2001). Some physicians' desire to avoid reputational harm is so great that, in the event they are sued, they will go to great lengths to preserve their reputation—"insisting on vindication through trial rather than settling out of court,…pressuring hospitals to offer payment in exchange for having the physician dropped from the complaint" (Sage, 2004b, pg. 174). They may also file a lawsuit against the patient or media outlet(s) publicizing the case for defamation of character (Sage, 2004b).

Since malpractice cases can take anywhere from a few months to a few years to be adjudicated (Seabury et al., 2013), physicians may experience a significant loss of income. And, there is a lot of uncertainty surrounding the outcome of malpractice cases. Thus, patients whose injuries were not caused by medical errors may be awarded compensation for their injuries, resulting in a false-positive decision (Brennan et al., 1996; Studdert et al., 2006).

Alternatively, following a harmful medical error, physicians may decide to disclose what happened to patients and/or their families and accept the personal and professional consequences of their actions. Disclosure is not risk-free. In some instances, patients with harmful injuries may sue for malpractice, despite disclosure. In a vignette

study of parents, Hobgood et al. (2005) found that when presented with medical errors that they deemed moderate, compared to minor, parents were less likely to take legal action following disclosure (relative risk = 1.25; 95% CI: 1.05 – 1.45). However, "if parents thought that the error was severe, their desire for legal action was less amendable to reduction by disclosure" (relative risk = 0.74; 95% CI: 0.59 – 0.90) (pg. 1284). Since severe injuries can have a significant, adverse impact on individuals' quality of life, they may be motivated to sue, despite disclosure, to obtain the resources they need to care for themselves.

The results of this study suggest that physicians' malpractice concerns may encourage them to engage in disclosure. A statistically significant relationship was found between harm severity, malpractice risk, and disclosure. Physicians are "somewhat likely" to "highly likely" to disclose harmful medical errors, regardless of their perceived likelihood of being sued for what happened. The observed relationship between harm severity and disclosure is consistent with the attitudinal beliefs of physicians published in prior studies (White et al., 2008; Linthorst et al., 2012). In a study of medical trainees at two U.S. academic medical centers, 99% of respondents agreed that serious medical errors[9] should be disclosed, compared to 84% of respondents for minor medical errors[10] (p-value = 0.031) (White et al., 2008). Similarly, in a study of internists and internist trainees conducted by Linthorst et al. (2012), 93.8% of respondents said they would probably or certainly report a major error to the patient. In contrast, 60.7% of respondents stated that they would probably or certainly report a minor error to the patient. Only

[9] The authors defined a serious error as one that "causes permanent injury or transient but potentially life-threatening harm" (White et al., 2008, pg. 252).
[10] The authors defined a minor error as one that "causes harm that is neither permanent nor potentially life-threatening" (White et al., 2008, pg. 252).

26.7% of them stated that they would probably or certainly report a near miss to the patient. Similarly, Garbutt et al. (2007) and White et al. (2008) found that many physicians believe that near misses do not need to be disclosed to patients.

Not surprisingly, due to this study's use of hypothetical vignettes and methods susceptible to social desirability bias, physicians indicated that they would disclose medical errors, regardless of whether what happened was apparent to patients and/or their families. However, consistent with the theoretical framework for this study, the likelihood of disclosure increased as what happened became more apparent to patients and/or their families. These findings are consistent with the results of prior studies, which suggest that physicians are more apt to disclose more apparent errors compared to less apparent errors (Gallagher et al., 2006a; Loren et al., 2008; White et al., 2011). For instance, in Loren et al.'s (2008) vignette study of pediatricians practicing in the United States, 75% of respondents reported that they would definitely disclose the more apparent error, an insulin overdose, while only 34% said they would definitely disclose the less apparent error, failing to check lab results (p-value < 0.001).

Disclosing readily apparent errors is in physicians' best interest. If errors are apparent to patients and/or their families, then they may ask about them. If physicians are not forthcoming, then patients and/or their families may file a malpractice lawsuit, viewing it as the only way of finding out what really happened to them or a loved one (Hickson et al., 1992; Vincent et al., 1994; Witman et al., 1996; Schwappach & Koeck, 2004). Compared to readily apparent errors, physicians may be less apt to disclose not readily apparent or somewhat apparent errors due to asymmetric information. Lacking specialized knowledge, patients may not realize an error has occurred; therefore, they

would not have a reason to question the quality of care they are receiving or sue for information.

Essentially, physicians are basing their medical error disclosure decisions in part on the severity of the harm patients sustain as well as how apparent what happened is to them and/or their families. While this behavior may seem rational to physicians, it is unethical and inconsistent with the American Medical Association's Code of Medical Ethics, which calls for "honest[y] in all professional interactions" (American Medical Association, 2016, pg. 1). Their behavior is also inconsistent with many patients' expectations. Following unanticipated health outcomes, many patients want an apology, an explanation of what happened to them, and a promise that steps will be taken to prevent similar occurrences in the future. Denied this, they may sue their providers for malpractice (Hickson et al., 1992; Vincent et al., 1993; Vincent et al., 1994; Witman et al., 1996; Wu, 1999; Schwappach & Kopeck, 2004).

While this study focused primarily on physician-level behaviors, ecological models of behavior posit that human behavior is influenced by a variety of different factors, such as personal beliefs, interpersonal relationships, and the larger social and physical environment (Sallis & Owen, 2015). Applied to the topic of disclosure, these models suggest that physicians' disclosure practices may be influenced, in part, by the culture of the organizations that employ them. However, this study did not find a statistically significant relationship between organizational culture and physicians' willingness to disclosure.

Similarly, Etchegaray, Gallagher, Bell, Sage, and Thomas (2017) examined the relationship between organizational culture and the intent to disclose amongst clinical

faculty at the University of Texas Health System. Amongst those who received disclosure training, there was not a statistically significant relationship between safety culture, teamwork culture, and the intent to disclose (correlations of 0.08 and 0.07, respectively). However, amongst faculty who reported not receiving any training, there was a statistically significant, albeit very weak, positive correlation between safety culture, teamwork culture, and intent to disclose (correlations of 0.21 and 0.19, respectively). Taken together, these findings suggest that organizational culture has little, if any, effect on physicians' disclosure intentions, at least amongst the study population. Since this study and the one conducted by Etchegaray et al. (2017) used different measures of safety culture (see Table 29), yet reached similar conclusions regarding the relationship between safety culture and disclosure, future research should examine whether these findings are sensitive to alternative ways of operationalizing safety culture.

Table 33: Operationalizing Safety Culture

This Study*	Etchegaray et al. (2017)^
In my workplace, the procedures and systems that are in place are good at preventing medical errors from happening.	I would feel safe being treated in this clinical area as a patient.
In my workplace, reporting (medical errors/adverse events) to the institution (e.g. risk managers, patient safety advocates, etc.) is considered an important component of patient safety.	Medical errors are handled appropriately in this clinical area.
My supervisor/manager seriously considers my suggestions for improving patient safety.	I know the proper channels to direct questions regarding patient safety in this clinical area.
In my workplace, direct care providers (e.g. physicians, nurses) are regularly doing things to improve patient safety.	In this clinical area, it is difficult to discuss medical errors.
When I have patient safety concerns, my colleagues encourage me to report them to the appropriate personnel (e.g. my supervisor, risk managers, patient safety advocates, etc.).	I am encouraged by my colleagues to report any patient safety concerns I may have.
In my workplace, it is easy for me to learn from others' mistakes.	The culture in this clinical area makes it easy to learn for the errors of others.
	I receive appropriate feedback about my performance.

Notes:

*All items were measured on a four-point Likert scale where 1 = strongly agree and 4 = strongly disagree.

^All items were measured on a five-point Likert scale where 1 = strongly disagree and 5 = strongly agree.

Limitations

There are three primary limitations associated with this study. First, due to the limited information included in the sampling frame, I was unable to perform a thorough non-response analysis. While responders and non-responders did not differ with respect to practice area and location, they may have different demographic characteristics. Since prior research suggests that responders and non-responders may differ in terms of gender, age, and number of years in practice (Cull et al., 2005; McFarlene et al., 2007; Bjertnaes et al., 2008) the possibility of non-response bias cannot be ruled out.

Second, there is the possibility of social desirability bias. Since policymakers, ethicists, and researchers have emphasized, and are continuing to emphasize, the importance of disclosing medical errors and adverse events to patients and/or their families, it is possible that some of the respondents said they would engage in disclosure, but not actually do so in practice. Prior research suggests that physicians who support error disclosure do not always disclose their errors to patients and their families (Ghalandarpoorattar et al., 2012). However, the effects of social desirability may be attenuated to some extent, given that physicians stated they were less apt to disclose medical errors that are not harmful. Perhaps, a better way to examine disclosure practices would be to shadow physicians to determine whether they engage in disclosure following a medical error or adverse event.

However, physicians who know they are being observed may temporarily change their behavior, a phenomenon known as the Hawthorne effect. In a systematic review, Choi, Jung, and Grantcharov (2019) found that observed healthcare professionals often engaged in "'positive' behavioral changes defined as increased productivity, compliance, or adherence to best practice guidelines or protocols" (pg. 28). This suggests that a study designed to observe physicians' disclosure-related behaviors is apt to overestimate how often they disclose medical errors and adverse events to patients and their families. Similarly, observation may affect what physicians choose to tell them. Specifically, they may be more apt to apologize for what happened and offer assurances that they will take steps to prevent similar occurrences from happening in the future, given that this is what many patients want following an error. Additionally, since observation can be incredibly

time-consuming and labor-intensive, I might be unable to collect enough data to perform the statistical analyses needed to answer my research questions.

Lastly, since a simple random sample of practicing Minnesota physicians was selected, this study's results may not be generalizable to physicians practicing in other states. Each state's medicolegal environment is unique. The extent to which the contents of disclosure conversations are admissible in court varies from state to state (Mastroianni et al., 2010). In states where statements of apology and the contents of disclosure conversations are deemed inadmissible in court, physicians may be more apt to engage in disclosure.

Strengths

There are three primary strengths associated with this study. First, to examine the relationship between harm severity, apparentness, and disclosure, I planned to use the same vignettes used in previous studies (Espin et al., 2006; Fein et al., 2007; White et al., 2011) so that I could easily compare my findings to their findings. However, during my cognitive interviews, numerous physicians stated that the situations depicted in these vignettes were outdated and unlikely to occur today, given advances in patient safety over the years. To correct for this failure, I identified seventeen vignettes which better reflected the realities of current medical practice from a list of medical error and adverse event vignettes compiled by the National Rural Bioethics Project. Prior to fielding this study, I pilot tested these vignettes using a Qualtrics^{TM} web survey sent to physicians who were not sampled for this study. The pilot test assessed their relevance to the current practice environment, the type of event being depicted (i.e. medical error or adverse event), and the level of harm the patient sustained. A total of 456 physicians completed

the survey, which confirmed that the seventeen vignettes better reflected the realities of contemporary medical practice, compared to the vignettes taken from previous studies.

Second, in this study, apparentness was conceptualized and measured as a unipolar phenomenon lying on a continuum from not readily apparent to readily apparent. While I had my own a priori dichotomous classification of apparentness for each of the vignettes, I asked physicians to rate the apparentness of the vignettes using the continuum approach. For all statistically analyses, I used physicians' apparentness rating, not my own. In contrast, in prior research Gallagher et al. (2006b) and White et al. (2011) treated apparentness as a dichotomous variable—more apparent or less apparent—and appear to be using their own apparentness classifications during data analysis. In doing this, they are assuming that physicians would agree with their classification without providing evidence that this is indeed the case.

Lastly, for each of the vignettes, I asked physicians to rate the severity of the harm that patients sustained as either unknown, none, mild, moderate, severe, or death. While I combined some of the harm severity categories (e.g. 0 = unknown, none, or mild, 1 = moderate, 2 = severe or death) prior to performing some of my analyses, the categories I used differ from those used in prior research. Garbutt et al. (2007) and White et al. (2008) examined general attitudes towards the disclosure of near misses, minor errors, and serious errors amongst pediatricians and medical trainees, respectively. Similarly, Linthorst et al. (2012) examined general attitudes towards the disclosure of near misses, minor errors, and major errors amongst internists and internists in training. While informative, these studies did not explore the grey area between minor errors and serious or major errors. Using a more comprehensive conceptualization of harm severity,

I was able to examine physicians' attitudes toward the disclosure of medical errors that cause no harm and mild, moderate, or serious harm. Additionally, I was able to examine how varying levels of harm influence the likelihood if disclosure.

Implications

The physician-patient relationship is based, in part, on trust—patients trust that their physicians will be honest and provide them with the best care possible. Patients trust that physicians will provide them with an accurate diagnosis and inform them of possible treatment options and their inherent risks. However, the trust that patients have in physicians, and possibly healthcare professionals in general, can be significantly diminished following a medical error. Considering this, physicians may find honestly disclosing medical errors to patients and their families in a timely manner to be an incredibly challenging endeavor. Nevertheless, following a medical error, many patients want to know what happened, and they want to be assured that steps will be taken to prevent similar occurrences in the future. When physicians are not forthcoming about an error, patients or their loved ones may sue for malpractice in order to find out what happened (Hickson et al., 1992; Vincent et al., 1993; Vincent et al., 1994; Witman et al., 1996; Wu, 1999; Schwappach & Koeck, 2004).

This study demonstrates that physicians are likely to disclose medical errors, regardless of their perception that doing so will result in a malpractice lawsuit. While malpractice concerns may not deter physicians from engaging in disclosure, it may affect what they choose to tell patients and their families. Future research should examine how physicians' malpractice concerns influence what they say happened, especially in regard to what caused the error. This type of research will provide insight into whether what

physicians tell patients is meeting their informational needs as well as whether physicians need additional disclosure training.

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Appendix A: Interview Script for the First Round of Pilot Testing

Introduction

Thank you for agreeing to help me with my dissertation research! My research will examine some of the factors that influence physicians' willingness to disclose adverse events and medical errors. To get a better idea of what these terms mean to physicians, I am going to ask you some questions related to their use. This should take about 30 – 45 minutes. Would you mind if I recorded our conversation?

Randomize the order of AE, PAE, and ME Questions

1. What does the term adverse event mean to you?
    - *If their definition is different, give them my definition of AE.*
        i. Adverse event: an unintended injury caused by medical management, not a patient's underlying health condition, that results in temporary injury, permanent disability, and/or death (e.g. not having a known allergy to penicillin, taking it for the first time, and having an allergic reaction to it)
            1. What would you change about this definition to make it more consistent with your understanding of adverse events?

2. When you hear the phrase adverse event, what types of things come to mind?
    - *As they are talking, pay attention to the harm and observability of the events they are describing. Adverse events result in harm that patients are cognizant of.*
        i. Harm: patient suffers a temporary or permanent injury, including death
        ii. Harm observability: patient realizes they have been harmed (e.g. missing a body part, severe abdominal pain, etc.)
        iii. Event observability: patient is cognizant that something happened to them

3. What does the term medical errors mean to you?
    - *If their definition is different, give them my definition.*
        i. Medical error: an error that occurs due to human fallibility, system fallibility, or the dynamic interaction between them. They do not cause temporary or permanent injuries, include death, to patients (e.g. missed or delayed diagnosis).
            1. What would you change about this definition to make it more consistent with your understanding of medical errors?

4. When you hear the phrase medical error, what types of things come to mind?
    - *As they are talking, pay attention to the harm and observability of the events they are describing. Medical errors do not result in harm. If they do, they become preventable adverse events.*

5. What does the term preventable adverse events mean to you?
    - *If their definition is different, give them my definition.*
        i. Preventable adverse event: an event that is caused by human fallibility, system fallibility, or the dynamic interaction between them and results in temporary or permanent harm to patients, including death.
            1. What would you change about this definition to make it more consistent with your understanding of preventable adverse events?

6. When you hear the phrase preventable adverse event, what types of things come to mind?
    - *As they are talking, pay attention to the harm and observability of the events they are describing. Preventable adverse events harm patients and are caused by human fallibility, system fallibility, or the dynamic interaction between them.*

7. To you, what is the primary difference between an adverse event and a medical error?
    - *If they don't mention harm:*
        - Does the level of harm a patient sustains influence whether something is considered an adverse event or medical error? If so, how?

Classification of Clinical Vignettes

Now, I am going to present you with a series of vignettes. After you read each one, I am going to ask you a series of questions. *Give participant sheet depict each scenario individually.*

Scenario #1: The scrub and circulating nurses, anesthesia resident, and anesthesiologist are in the operating room prior to a liver transplant. The anesthesiologist asks out loud if the patient has any allergies. While the scrub nurse is busy arranging the surgical instruments, the resident is busy with another task, and neither of them responds; however, the circulating nurse says, "I didn't check the patient in, but no, I don't think so." The anesthesiologist proceeds to inject Cefazolin into the patient's IV. Later, the anesthesiologist checks the patient's chart and discover that the patient has an allergy to penicillin.

8. Would you classify this event as a medical error, adverse event, or something else?
    - Probe: Why do you consider this a *(insert person's response)*?

    i. *If they do not classify it as an ME, then ask what would need to change about the scenario to make it an ME.*
- Did it make sense?

Scenario #2: A 62-year-old diabetic patient with chronic renal insufficiency is admitted to the hospital with a new onset gastrointestinal bleed. He is made NPO (nothing by mouth) for endoscopy, but his medications were not held. Because of severe hypoglycemia the patient had a seizure, fell of his bed, and fractured his hip.

9. Would you classify this event as a medical error, adverse event, or something else?
    - Probe: Why do you consider this a *(insert person's response)*?
        i. *If they do not classify it as a PAE, then ask what would need to change about the scenario to make it an PAE.*
    - Did it make sense?

Scenario #3*:* You have admitted a diabetic patient to the hospital for a chronic obstructive pulmonary disease (COPD) exacerbation. You handwrite an order for the patient to receive "10 U" of insulin. The "U" in your order looks like a 0. The following morning, the patient is given 100 U of insulin, 10 times the patient's normal dose, and is later found unresponsive, with a serum glucose level of 35mg/dL (1.94 mmol/L). The patient is resuscitated and transferred to the intensive care unit where they are expected to make a full recovery.

10. Would you classify this event as a medical error, adverse event, or something else?
    - Probe: Why do you consider this a *(insert person's response)*?
        i. *If they do not classify it as an APE, then ask what would need to change about the scenario to make it an APE.*
    - Did it make sense?

Scenario #4*:* You are seeing a patient 3 weeks after elective splenectomy for ITP. The splenectomy was technically challenging because of the patient's obesity, but seemed uncomplicated. At this follow-up visit, the patient complains of vague persistent left upper quadrant (LUQ) pain. You send the patient for an abdominal x-ray film, which shows a foreign body consistent with a retained surgical sponge in the patient's LUQ. You remember that the sponge count was correct at the end of the procedure. However, you also remember that you packed off a small bleeding vessel near the stomach with a sponge, and do not recall removing the sponge. When you review the postoperative records, you observe that a math error was responsible for a falsely correct sponge count. You believe a subsequent operation to remove the retained sponge is indicated, and expect the patient will make a full recovery.

11. Would you classify this event as a medical error, adverse event, or something else?
    - Probe: Why do you consider this a *(insert person's response)*?

        i. *If they do not classify it as an PAE, then ask what would need to change about the scenario to make it an PAE.*
- Did it make sense?

Do you have any ideas for scenarios that you think would be good?

Appendix B: Survey Questions for Second Round of Pilot Testing

List of Scenarios Presented

A physician is seeing a female patient who has a moderate cognitive impairment. She is complaining of lower back pain. He recommends that she undergo a CT scan of her back. However, his imaging request is electronically entered as a CT scan of her brain. The radiology technologist does not verify the physician's electronic request using the patient's medical record and performs a CT scan of her brain. Upon seeing the results, the physician realizes that he ordered the wrong test and submits a new order for a CT scan of her back.

An elderly female presents to the ED complaining of severe stomach pain, nausea, and vomiting. She is diagnosed with appendicitis and scheduled for an emergency appendectomy. While in pre-op, she gets out of bed to use the bathroom, falls, and breaks her right arm. During a subsequent surgery, she dies on the operating table.

A 62-year-old, male patient with diabetes and chronic renal insufficiency is admitted to the hospital with a new onset gastrointestinal bleed. He is made NPO for endoscopy and given diazepam. While sedated, he tries to go to the bathroom but falls out of bed and fractures his left hip.

A male patient with no known drug allergies develops a maculopapular rash, which is consistent with a drug allergy to a medication he has recently been prescribed. Immediately, his physician stops the medication and treats his rash. He responds well to treatment, and his rash resolves.

You were seeing a female patient 3 weeks after an elective splenectomy for ITP. The splenectomy was technically challenging because of the patient's obesity, but seemed uncomplicated. At a follow-up visit, the patient complained of vague persistent LUQ pain, so you sent her for an abdominal x-ray. The film showed a foreign body consistent with a retained sponge in her LUQ. You remembered that the sponge count was correct at the end of the procedure. However, you also remembered that you packed off a small bleeding vessel near her stomach with a sponge, but do not recall removing it. She underwent a subsequent operation to remove the sponge and made a full recovery.

A urologist performs a needle biopsy on the prostate glands of two patients, John and Michael. The urologist correctly labels each specimen with the corresponding patient's identifying information and sends them to pathology for examination. Dr. Greene examines each specimen under a microscope and notes the presence of cancerous cells in John's sample. While Dr. Greene is entering the information into each patient's electronic medical record, she is interrupted by one of her assistants and enters the wrong information into each patient's file. After reviewing the pathology reports, the urologist tells John that he does not have cancer. He tells Michael that he does and recommends radiotherapy. A year later, John returns to the urologist, complaining of difficulty

urinating, frequent urges to urinate at night, and weak stream. A needle biopsy suggests prostate cancer and an evaluation shows disease metastatic to bone.

A female patient's mammography results indicate that she has a suspicious lump in both of her
breasts, so she is referred for a biopsy. A surgeon biopsies both breasts and sends the specimen to pathology. One of the samples indicates a malignancy. However, the specimens are not clearly labelled, so the pathologist is not sure which breast the tissue came from.

A physician is treating a 70-year-old male patient with uncontrolled Type II diabetes. He has diabetic neuropathy, a diabetic foot ulcer on his right foot, and gangrene on his left foot. Due to the severity of the gangrene, the physician recommends that he have his foot amputated. During surgery, the patient's right foot is amputated, instead of his left.

During a car accident two years ago, Shannon, a 28-year-old female, suffered permanent, debilitating head and spinal cord injuries. Now, she is a paraplegic, requires a shunt to prevent increased cranial pressure, and uses a gastrostomy tube due to problems swallowing. Shannon is admitted to the hospital for a shunt revision and develops aspiration pneumonia.

A physician works on the medical-surgical unit of a small, rural hospital. One evening, a few of the unit's nurses call-in sick, leaving him and two nurse's aides caring for 16 patients. A young boy is admitted to the unit with a primary infection of oral herpes. His mouth has several large, painful lesions and he is dehydrated. He has not eaten or drunken much in the past 24 hours. A pediatrician places an IV in his left arm. An hour later, the boy's mother presses the call button because she notices the area around the IV stick is becoming swollen and cool to the touch. Due to the difficulty associated with performing the initial IV placement and the staffing shortage, the IV is not redone until a few hours after the mother's initial call.

Ms. Jones has diabetes and is severely ill, so she goes to the ER. There, she is stabilized before being transferred to the medical floor. There, Jackie, a nurse, reviews the ER physician's orders. She notes that an IV is ordered as NS at 150cc/hr. She checks the IV fluid and notices it is NS but set at a rate of 5cc/hr on the IV pump, so she sets it to 150cc/hr. But, the pump is not hooked up to a bag of NS. It is attached to a small 100 cc bag of insulin that is hanging behind the bag of NS. Ms. Jones develops severe hypoglycemia and dies in the hospital.

Mr. Jenkins is admitted to the hospital with diagnoses of diabetes, renal disease, hypertension, and a foot infection. His physician cultures his foot wound, and after receiving the lab report, ordered several antibiotics, including Gentamicin Sulfate 60 mg IV q. 40 h. His physician orders a series of lab tests to assess his renal functioning and blood serum levels. However, the results are not closely monitored. Mr. Jenkins receives Gentamicin for three days and develops ototoxicity.

Ms. Smith is an elderly female patient with osteoarthritis in her left knee. She has been experiencing pain in that knee for a few years and has tried a variety of different treatments, including prescription NSAIDs, corticosteroid injections, and physical therapy. Since these treatments have not significantly decreased her pain, her physician recommends she undergo knee replacement surgery. Prior to surgery, she is asked to place a mark on the knee she is having surgery on. While preparing for surgery, the surgeon is called away to consult on an urgent case and asks a resident to perform the operation. The resident performs a knee replacement on Ms. Smith's right knee, not her left.

A 35 year old woman is using Nuva Ring. After a few months, she starts experiencing severe pain in her right calf. Also, her right leg is swollen and she is having difficulty breathing. Concerned, she goes to the doctor, where she is diagnosed with deep vein thrombosis and a pulmonary embolism. Immediately, the doctor takes her off of birth control and starts treating her with blood thinners.

Georgia has breast cancer and is undergoing chemotherapy. During her first cycle of chemo, she spikes a high fever and experiences violent chills. Alarmed, she goes to the ED. Blood tests indicate that Georgia has a very low neutrophil count. She is diagnosed with febrile neutropenia and an infection. She is treated with intravenous antibiotics in the hospital’s oncology ward.

James is a 16-year-old patient with leukemia. For the past three months, he has been receiving chemotherapy. He has a central venous access device (CVAD) and alopecia. Recently, James was admitted to the hospital with a fever that did not respond to the acetaminophen his parents had been giving him for the last twenty-four hours. Blood tests indicate that he has anemia, neutropenia, and thrombocytopenia, which is attributed to the chemotherapy.

Samantha and her 9 month old daughter Emily recently moved to another state. Samantha takes Emily to a local physician for a well-child visit. Wanting to ensure that Emily is up-to-date on her immunizations, Samantha asks the doctor about childhood vaccinations and gives him a copy of her daughter's immunization card. While reviewing the card, he notices that she has not received her third Haemophilus influenzae type B shot and administers it. Shortly thereafter, he receives a copy of Emily's medical record from her previous pediatrician and notices that she had already received her third Hib shot.

Five years ago, Jacob was hospitalized for diverticulitis while he was out of town visiting his niece. He responded well to treatment, except for an allergic reaction (body rash and facial edema) to ciprofloxacin. Jacob’s reaction was treated, and he was switched to metronidazole. Two days ago, Jacob was admitted to his local hospital with mild diverticulitis. He was in pain, nauseated, and dehydrated. He was started on metronidazole 500 mg q 6 hours IV until he could tolerate clear liquids, be switched to antibiotics, and discharged. When his condition improved, he was discharged with a prescription for Cipro 500 mg BID X 6 days. At the pharmacy, the pharmacist told him he was prescribed ciprofloxacin, which he should take twice daily for six days. Jacob said

he did not want to take the medication because the last time he took it he became severely ill. The pharmacist asked Jacob if he was allergic to any medications, but he was not sure. The pharmacist checked his medical records and discovered that he was indeed allergic to Cipro. He called Jacob's doctor, who confirmed the allergy, and switched him to metronidazole.

Questions asked after each vignette presented

Q1. How likely is this event to occur in real-life?

- ❍ Highly unlikely
- ❍ Unlikely
- ❍ Somewhat unlikely
- ❍ Somewhat likely
- ❍ Likely
- ❍ Highly likely

Q2. Is there anything you would change about this scenario to make it more realistic? If so, please specify.

Q3. Does this scenario depict a medical error, adverse event, or something else?

- ❍ Medical error
- ❍ Adverse event
- ❍ Other (please specify): _____

Q4. What level of harm, if any, did the patient sustain?

- ❍ Unknown
- ❍ None
- ❍ Mild
- ❍ Moderate
- ❍ Severe

Q5. Was the harm the patient sustained potentially life-threatening? *If the respondent selected mild, moderate, or severe harm for Q4, this question was displayed.*

- ❍ Yes
- ❍ No

Q6. What is the duration of harm to the patient? *If the respondent selected mild, moderate, or severe harm for Q4, this question was displayed.*

- ❍ Seconds
- ❍ Minutes
- ❍ Hours

- ❍ Days
- ❍ Weeks
- ❍ Months
- ❍ Years
- ❍ Decades
- ❍ Lifelong
- ❍ Other (please specify):

_____

Q7. Overall, how would you rate this scenario's usefulness in assessing physicians' thoughts on the disclosure of adverse events and medical errors to patients and/or their families?

- ❍ Very useful
- ❍ Moderately useful
- ❍ Somewhat useful
- ❍ Somewhat useless
- ❍ Moderately useless
- ❍ Very useless

Appendix C: Medical Error Disclosure Survey

Part 1: Legal Considerations

Q1. To what extent do each of the following encourage or discourage you from doing the following:

	STRONGLY ENCOURAGES	SOMEWHAT ENCOURAGES	SOMEWHAT DISCOURAGES	STRONGLY DISCOURAGES
a. My malpractice insurer _____ me from doing or saying anything that could be construed as an admission of legal liability (e.g. disclosing medical errors to patients and/or their families).	☐1	☐2	☐3	☐4
b. The health system I work for _____ me from doing or saying anything that could be construed as an admission of legal liability (e.g. disclosing medical errors to patients and/or their families).	☐1	☐2	☐3	☐4

Q2. Disclosing harmful medical errors to patients and/or their families will make them:

1 ☐ Much more likely to sue
2 ☐ Somewhat more likely to sue
3 ☐ Somewhat less likely to sue
4 ☐ Much less likely to sue

Q3. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. Failing to disclose harmful medical errors to patients and/or their families will make them suspicious of a cover-up and more likely to sue for malpractice.	☐1	☐2	☐3	☐4
b. Patients harmed by medical errors invariably want to know the truth, and when deprived of it, will consider litigation.	☐1	☐2	☐3	☐4
c. If disclosing harmful medical errors was not related to malpractice risk, it would be easier for me to disclose them to patients and/or their families.	☐1	☐2	☐3	☐4

Part 2: Human Fallibility

Q4. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. I believe that medicine is both an art and a science that could result in unexpected injuries or deaths.	☐1	☐2	☐3	☐4
b. My patients believe that medicine is both an art and a science that could result in unexpected injuries or deaths.	☐1	☐2	☐3	☐4
c. Disclosing medical errors will negatively affect a provider's career.	☐1	☐2	☐3	☐4

Q5. Disclosing medical errors to my patients and/or their families would have the following impact on my professional reputation: *Circle the number that best represents your answer.*

1	2	3	4	5	6	7	8	9	10
A Substantial Negative Impact									**A Substantial Positive Impact**

Q6. How much easier would it be for you to disclose medical errors to each of the following if there was no potential for stigmatization associated with disclosing them:

	NOT AT ALL EASIER	A LITTLE EASIER	SOMEWHAT EASIER	MUCH EASIER
a. Your patients and/or their families	☐1	☐2	☐3	☐4
b. Your colleagues	☐1	☐2	☐3	☐4
c. The health system you work for	☐1	☐2	☐3	☐4

Q7. How humiliated does having to admit to patients and/or their families that you made a mistake make you feel? *Circle the number that best represents your answer.*

1	2	3	4	5	6	7	8	9	10
Not at All									**Extremely**

Part 3: Practice Culture

Q8. **In your workplace**, how much of a priority is patient safety?

1 ☐ The top priority
2 ☐ In top 3
3 ☐ In top 5
4 ☐ In top 10
5 ☐ Less than that

Q9. **In your workplace**, how often does each of the following occur:

	NEVER	RARELY	SOMETIMES	FREQUENTLY	ALL THE TIME
a. Direct care providers (e.g. physicians, nurses) freely speak up when they see something that could negatively affect patient safety.	☐1	☐2	☐3	☐4	☐5
b. Direct care providers (e.g. physicians, nurses) are informed of problems that affect patient safety.	☐1	☐2	☐3	☐4	☐5
c. Direct care providers (e.g. physicians, nurses) discuss ways to prevent patient safety problems from happening again.	☐1	☐2	☐3	☐4	☐5

Q10. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. In my workplace, direct care providers (e.g. physicians, nurses) feel like their mistakes are held against them.	☐1	☐2	☐3	☐4
b. In my workplace, it is difficult for direct care providers (e.g. physicians, nurses) to discuss patient safety issues.	☐1	☐2	☐3	☐4
c. In my workplace, it is difficult for me to speak up when I perceive a problem with patient safety.	☐1	☐2	☐3	☐4
d. My supervisor/manager routinely overlooks patient safety problems that happen repeatedly.	☐1	☐2	☐3	☐4
e. When I have patient safety concerns, my colleagues encourage me to report them to the appropriate personnel (e.g. my supervisor, risk managers, patient safety advocates, etc.).	☐1	☐2	☐3	☐4
f. My supervisor/manager seriously considers my suggestions for improving patient safety.	☐1	☐2	☐3	☐4
g. In my workplace, when changes are made to improve patient safety, there effectiveness is evaluated.	☐1	☐2	☐3	☐4
h. In my workplace, it is easy for me to learn from others' mistakes.	☐1	☐2	☐3	☐4
i. In my workplace, the procedures and systems that are	☐1	☐2	☐3	☐4

	in place are good at preventing medical errors from happening.				
j.	In my workplace, reporting medical errors to the institution (e.g. risk managers, patient safety advocates, etc.) is considered an important component of patient safety.	☐1	☐2	☐3	☐4
k.	In my workplace, direct care providers (e.g. physicians, nurses) are regularly doing things to improve patient safety.	☐1	☐2	☐3	☐4
l.	In my workplace, the lack of supportive forums for and policies regarding the disclosure of medical errors prevents me from disclosing them to patients and/or their families.	☐1	☐2	☐3	☐4

Q11. **In your workplace**, how often are each of the following reported to the organization when they occur:

	NEVER	RARELY	SOMETIMES	USUALLY
a. Near misses	☐1	☐2	☐3	☐4
b. Medical errors that have ***no potential*** to harm patients	☐1	☐2	☐3	☐4
c. Medical errors that ***could potentially*** harm patients but don't	☐1	☐2	☐3	☐4
d. Medical errors that cause patients ***mild harm***	☐1	☐2	☐3	☐4
e. Medical errors that cause patients ***moderate harm***	☐1	☐2	☐3	☐4
f. Medical errors that cause patients ***serious harm***	☐1	☐2	☐3	☐4

Q12. **In your workplace**, how often does the following occur:

	NEVER	RARELY	SOMETIMES	USUALLY
a. Medical errors, regardless of their potential to cause harm or the harm actually caused, are disclosed to patients and/or their families.	☐1	☐2	☐3	☐4

Q13. How easy or difficult does the culture of your workplace make each of the following?

	VERY EASY	SOMEWHAT EASY	SOMEWHAT DIFFICULT	VERY DIFFICULT
a. Disclosing medical errors to patient safety employees, such as risk managers	☐1	☐2	☐3	☐4
b. Disclosing medical errors to your colleagues	☐1	☐2	☐3	☐4
c. Disclosing medical errors to patients and/or their families	☐1	☐2	☐3	☐4

Part 4: Professional Ethics

Q14. How strongly do you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. The need to disclose medical errors to patients and/or their families is a proportionate one—it increases as the harm or risk of harm to the patient increases.	☐[1]	☐[2]	☐[3]	☐[4]
b. I prefer not to do or say anything that could be construed as an admission of legal liability.	☐[1]	☐[2]	☐[3]	☐[4]

Q15. How likely or unlikely would you be to disclose the following to one of ***your*** patients and/or their families, if it was to occur:

	UNLIKELY									LIKELY
a. A near miss	1	2	3	4	5	6	7	8	9	10
b. A medical error that has ***no potential*** *to harm* the patient	1	2	3	4	5	6	7	8	9	10
c. A medical error that could ***potentially harm*** the patient but do not	1	2	3	4	5	6	7	8	9	10
d. A medical error that causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
e. A medical error that causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
f. A medical error that causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Q16. How likely or unlikely would you be to disclose the following to one of ***your*** patients and/or their families, if it was to occur:

	UNLIKELY									LIKELY
A medical error that is **not readily apparent** to the patient and										
a. Has ***no potential to harm*** the patient	1	2	3	4	5	6	7	8	9	10
b. Could ***potentially harm*** the patient but does not	1	2	3	4	5	6	7	8	9	10
c. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
d. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
e. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10
A medical error that is **readily apparent** to the patient and										
a. Has ***no potential to harm*** the patient	1	2	3	4	5	6	7	8	9	10
b. Could ***potentially harm*** the patient but does not	1	2	3	4	5	6	7	8	9	10
c. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
d. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
e. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Q17. While some medical errors are readily apparent to patients, others are not as readily apparent. At what point does the apparentness of a medical error influence your willingness to disclose it to patients and/or their families?

1	2	3	4	5	6	7	8	9	10
Not at All Apparent									**Readily Apparent**

Q18. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. When medical errors occur, I disclose them to patients and/or their families because that is the way I would like to be treated if I were in their shoes.	☐1	☐2	☐3	☐4
b. When medical errors occur, I feel an obligation to make it clear to the patient and/or their families that what happened was a mistake.	☐1	☐2	☐3	☐4
c. I take responsibility for my actions when they have a serious, adverse impact on patients' health and well-being.	☐1	☐2	☐3	☐4

Q19. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. Disclosing medical errors is the right thing to do, even if it comes at a significant personal or professional cost.	☐1	☐2	☐3	☐4
b. Failing to disclose medical errors to patients and/or their families is deceptive and undermines their trust in the health care system.	☐1	☐2	☐3	☐4

Part 5: Self-efficacy

Q20. Next, I'd like to ask you about any training on disclosing medical errors you have received.

	NONE	A LITTLE	SOME	A LOT	A GREAT DEAL
a. How much education or training on disclosing medical errors to patients and/or their families have you received?	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]
b. How much experience do you have disclosing medical errors to patients and/or their families?	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]

Q21. How comfortable or uncomfortable would you feel disclosing the following to one of ***your*** patients and/or their families, if it was to occur:

	COMFORTABLE									UNCOMFORTABLE
A medical error that is **not readily apparent** to the patient and										
a. Has ***no potential to harm*** the patient	1	2	3	4	5	6	7	8	9	10
b. Could ***potentially harm*** the patient but does not	1	2	3	4	5	6	7	8	9	10
c. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
d. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
e. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10
A medical error that is **readily apparent** to the patient and										
a. Has ***no potential to harm*** the patient	1	2	3	4	5	6	7	8	9	10
b. Could ***potentially harm*** the patient but does not	1	2	3	4	5	6	7	8	9	10
c. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
d. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
e. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Part 6: Clinical Scenarios

In this section, you will be presented with a series of clinical vignettes. Please read each vignette carefully and answer the corresponding questions.

Q22. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0 1 2 3 4 5 6 7 8 9 10
Not Readily Apparent **Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1 2 3 4 5 6 7 8 9 10
Highly Unlikely **Highly Likely**

e. If you had to disclose this event to the patient and/or their family, what would you tell them?

_____

_____

_____

_____

_____

_____

_____

_____

f. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q23. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Not Readily Apparent								**Readily Apparent**		

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If you had to disclose this event to the patient and/or their family, what would you tell them?

_____

_____

_____

_____

_____

_____

_____

_____

_____

f. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q24. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Not Readily Apparent								**Readily Apparent**		

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If you had to disclose this event to the patient and/or their family, what would you tell them?

_____

_____

_____

_____

_____

_____

_____

_____

_____

f. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q25. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1 2 3 4 5 6 7 8 9 10

Highly Unlikely **Highly Likely**

e. If you had to disclose this event to the patient and/or their family, what would you tell them?

_____

_____

_____

_____

_____

_____

_____

_____

_____

f. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1] **Very likely** ☐[2] **Likely** ☐[3] **Unlikely** ☐[4] **Very unlikely**

Part 7: About You…

Q26. Please select your sex.

1 ☐ Male 2 ☐ Female

Q27. Do you consider yourself Hispanic, Latino, or Latina?

1 ☐ Yes 2 ☐ No

Q28. What is your race? *Check all that apply.*

1 ☐ Caucasian
2 ☐ African American
3 ☐ American Indian or Alaskan Native
4 ☐ Asian or Pacific Islander
5 ☐ Other (please specify): _____

Q29. How old are you?

|___|___| Years

Q30. What is your primary area of practice/specialty? Please specify.

_____

Q31. How many years have you been practicing medicine?

|___|___| Years

Q32. In which zip code, do you primarily practice?

|___|___|___|___|___|

Q33. Please specify what percentage of your time is spent in each of the following:

A. Clinical care	|___|___|___|%
B. Hospital care	|___|___|___|%
C. Research	|___|___|___|%
D. Other	|___|___|___|%
Total	100%

Q34. Have you ever provided medical testimony in a legal deposition that was related to medical malpractice?

1 ☐ Yes
2 ☐ No

Q35. Have you ever been named as a defendant in a medical malpractice lawsuit?

1 ☐ Yes
2 ☐ No

Q36. How many malpractice claims have been filed against you?

0 ☐ Zero
1 ☐ One
2 ☐ Two
3 ☐ Three
4 ☐ Four
5 ☐ Five or more

Appendix D: Adverse Event Disclosure Survey

Part 1: Legal Considerations

Q1. To what extent do each of the following encourage or discourage you from doing the following:

	STRONGLY ENCOURAGES	SOMEWHAT ENCOURAGES	SOMEWHAT DISCOURAGES	STRONGLY DISCOURAGES
a. My malpractice insurer _____ me from doing or saying anything that could be construed as an admission of legal liability (e.g. disclosing adverse events to patients and/or their families).	☐1	☐2	☐3	☐4
b. The health system I work for _____ me from doing or saying anything that could be construed as an admission of legal liability (e.g. disclosing adverse events to patients and/or their families).	☐1	☐2	☐3	☐4

Q2. Disclosing adverse events to patients and/or their families will make them:

1 ☐ Much more likely to sue
2 ☐ Somewhat more likely to sue
3 ☐ Somewhat less likely to sue
4 ☐ Much less likely to sue

Q3. Please rate how strongly you agree or disagree with the following statements:

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
a. Failing to disclose adverse events to patients and/or their families will make them suspicious of a cover-up and more likely to sue for malpractice.	☐1	☐2	☐3	☐4
b. Patients harmed by adverse events invariably want to know the truth, and when deprived of it, will consider litigation.	☐1	☐2	☐3	☐4
c. If disclosing adverse events was not related to malpractice risk, it would be easier for me to disclose them to patients and/or their families.	☐1	☐2	☐3	☐4

Part 2: Human Fallibility

Q4. Please rate how strongly you agree or disagree with the following statements:

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
a. I believe that medicine is both an art and a science that could result in unexpected injuries or deaths.	☐1	☐2	☐3	☐4
b. My patients believe that medicine is both an art and a science that could result in unexpected injuries or deaths.	☐1	☐2	☐3	☐4
c. Disclosing adverse events will negatively affect a provider's career.	☐1	☐2	☐3	☐4

Q5. Disclosing adverse events to my patients and/or their families would have the following impact on my professional reputation: *Circle the number that best represents your answer.*

1	2	3	4	5	6	7	8	9	10
A Substantial Negative Impact									**A Substantial Positive Impact**

Q6. How much easier would it be for you to disclose adverse events to each of the following if there was no potential for stigmatization associated with disclosing them:

	NOT AT ALL EASIER	A LITTLE EASIER	SOMEWHAT EASIER	MUCH EASIER
a. Your patients and/or their families	☐1	☐2	☐3	☐4
b. Your colleagues	☐1	☐2	☐3	☐4
c. The health system you work for	☐1	☐2	☐3	☐4

Q7. How humiliated does having to admit to patients and/or their families that you made a mistake make you feel? *Circle the number that best represents your answer.*

1	2	3	4	5	6	7	8	9	10
Not at All									**Extremely**

Part 3: Practice Culture

Q8. **In your workplace**, how much of a priority is patient safety?

1 ☐ The top priority
2 ☐ In top 3
3 ☐ In top 5
4 ☐ In top 10
5 ☐ Less than that

Q9. **In your workplace**, how often does each of the following occur:

	NEVER	RARELY	SOMETIMES	FREQUENTLY	ALL THE TIME
a. Direct care providers (e.g. physicians, nurses) freely speak up when they see something that could negatively affect patient safety.	☐1	☐2	☐3	☐4	☐5
b. Direct care providers (e.g. physicians, nurses) are informed of problems that affect patient safety.	☐1	☐2	☐3	☐4	☐5
c. Direct care providers (e.g. physicians, nurses) discuss ways to prevent patient safety problems from happening again.	☐1	☐2	☐3	☐4	☐5

Q10. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. In my workplace, direct care providers (e.g. physicians, nurses) feel like their mistakes are held against them.	☐1	☐2	☐3	☐4
b. In my workplace, it is difficult for direct care providers (e.g. physicians, nurses) to discuss patient safety issues.	☐1	☐2	☐3	☐4
c. In my workplace, it is difficult for me to speak up when I perceive a problem with patient safety.	☐1	☐2	☐3	☐4
d. My supervisor/manager routinely overlooks patient safety problems that happen repeatedly.	☐1	☐2	☐3	☐4
e. When I have patient safety concerns, my colleagues encourage me to report them to the appropriate personnel (e.g. my supervisor, risk managers, patient safety advocates, etc.).	☐1	☐2	☐3	☐4
f. My supervisor/manager seriously considers my suggestions for improving patient safety.	☐1	☐2	☐3	☐4
g. In my workplace, when changes are made to improve patient safety, there effectiveness is evaluated.	☐1	☐2	☐3	☐4

h.	In my workplace, it is easy for me to learn from others' mistakes.	☐[1]	☐[2]	☐[3]	☐[4]
i.	In my workplace, the procedures and systems that are in place are good at preventing adverse events from happening.	☐[1]	☐[2]	☐[3]	☐[4]
j.	In my workplace, reporting adverse events to the institution (e.g. risk managers, patient safety advocates, etc.) is considered an important component of patient safety.	☐[1]	☐[2]	☐[3]	☐[4]
k.	In my workplace, direct care providers (e.g. physicians, nurses) are regularly doing things to improve patient safety.	☐[1]	☐[2]	☐[3]	☐[4]
l.	In my workplace, the lack of supportive forums for and policies regarding the disclosure of adverse events prevents me from disclosing them to patients and/or their families.	☐[1]	☐[2]	☐[3]	☐[4]

Q11. **In your workplace**, how often are each of the following reported to the organization when they occur:

	NEVER	RARELY	SOMETIMES	USUALLY
a. Adverse events that cause patients ***mild harm***	☐1	☐2	☐3	☐4
b. Adverse events that cause patients ***moderate harm***	☐1	☐2	☐3	☐4
c. Adverse events that cause patients ***serious harm***	☐1	☐2	☐3	☐4

Q12. **In your workplace**, how often does the following occur:

	NEVER	RARELY	SOMETIMES	USUALLY
a. Adverse events, regardless of the severity of the harm they cause, are disclosed to patients and/or their families.	☐1	☐2	☐3	☐4

Q13. How easy or difficult does the culture of your workplace make each of the following?

	VERY EASY	SOMEWHAT EASY	SOMEWHAT DIFFICULT	VERY DIFFICULT
a. Disclosing adverse events to patient safety employees, such as risk managers	☐1	☐2	☐3	☐4
b. Disclosing adverse events to your colleagues	☐1	☐2	☐3	☐4
c. Disclosing adverse events to patients and/or their families	☐1	☐2	☐3	☐4

Part 4: Professional Ethics

Q14. How strongly do you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. The need to disclose adverse events to patients and/or their families is a proportionate one—it increases as the harm or risk of harm to the patient increases.	☐1	☐2	☐3	☐4
b. I prefer not to do or say anything that could be construed as an admission of legal liability.	☐1	☐2	☐3	☐4

Q15. How likely or unlikely would you be to disclose the following to one of ***your*** patients and/or their families, if it was to occur:

	UNLIKELY									LIKELY
a. An adverse event that causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
b. An adverse event that causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
c. An adverse event that causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Q16. How likely or unlikely would you be to disclose the following to one of ***your*** patients and/or their families, if it was to occur:

	UNLIKELY									LIKELY
An adverse event that is **not readily apparent** to the patient and										
a. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
b. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
c. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10
An adverse event that is **readily apparent** to the patient and										
a. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
b. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
c. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Q17. While some adverse events are readily apparent to patients, others are not as readily apparent. At what point does the apparentness of an adverse event influence your willingness to disclose it to patients and/or their families?

1	2	3	4	5	6	7	8	9	10
Not at All Apparent									**Readily Apparent**

Q18. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. When adverse events occur, I disclose them to patients and/or their families because that is the way I would like to be treated if I were in their shoes.	☐1	☐2	☐3	☐4
b. I take responsibility for my actions when they have a serious, adverse impact on patients' health and well-being.	☐1	☐2	☐3	☐4

Q19. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. Disclosing adverse events is the right thing to do, even if it comes at a significant personal or professional cost.	☐1	☐2	☐3	☐4
b. Failing to disclose adverse events to patients and/or their families is deceptive and undermines their trust in the health care system.	☐1	☐2	☐3	☐4

Part 5: Self-efficacy

Q20. Next, I'd like to ask you about any training on disclosing adverse events you have received.

	NONE	A LITTLE	SOME	A LOT	A GREAT DEAL
a. How much education or training on disclosing adverse events to patients and/or their families have you received?	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]
b. How much experience do you have disclosing adverse events to patients and/or their families?	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]

Q21. How comfortable or uncomfortable would you feel disclosing the following to one of ***your*** patients and/or their families, if it was to occur:

	COMFORTABLE									UNCOMFORTABLE
An adverse event that is **not readily apparent** to the patient and										
a. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
b. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
c. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10
An adverse event that is **readily apparent** to the patient and										
a. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
b. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
c. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Part 6: Clinical Scenarios

In this section, you will be presented with a series of clinical vignettes. Please read each vignette carefully and answer the corresponding questions.

Q22. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):

_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If you had to disclose this event to the patient and/or their family, what would you tell them?

_____

_____

_____

_____

_____

_____

_____

_____

f. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q23. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	1	2	3	4	5	6	7	8	9	10
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If you had to disclose this event to the patient and/or their family, what would you tell them?

_____

_____

_____

_____

_____

_____

_____

_____

_____

f. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q24. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	1	2	3	4	5	6	7	8	9	10
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If you had to disclose this event to the patient and/or their family, what would you tell them?

_____

_____

_____

_____

_____

_____

_____

_____

_____

f. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q25. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	1	2	3	4	5	6	7	8	9	10
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If you had to disclose this event to the patient and/or their family, what would you tell them?

f. How likely is this event to result in a malpractice suit, if disclosed?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Part 7: About You…

Q26. Please select your sex.

1 ☐ Male 2 ☐ Female

Q27. Do you consider yourself Hispanic, Latino, or Latina?

1 ☐ Yes 2 ☐ No

Q28. What is your race? *Check all that apply.*

1 ☐ Caucasian
2 ☐ African American
3 ☐ American Indian or Alaskan Native
4 ☐ Asian or Pacific Islander
5 ☐ Other (please specify): _____

Q29. How old are you?

|___|___| Years

Q30. What is your primary area of practice/specialty? Please specify.
_____

Q31. How many years have you been practicing medicine?

|___|___| Years

Q32. In which zip code, do you primarily practice?

|___|___|___|___|___|

Q33. What percentage of your time is spent on each of the following:

A. Clinical care	|___|___|___|%
B. Hospital care	|___|___|___|%
C. Research	|___|___|___|%
D. Other	|___|___|___|%
Total	100%

Q34. Have you ever provided medical testimony in a legal deposition that was related to medical malpractice?

1 ☐ Yes
2 ☐ No

Q35. Have you ever been named as a defendant in a medical malpractice lawsuit?

1 ☐ Yes
2 ☐ No

Q36. How many malpractice claims have been filed against you?

0 ☐ Zero
1 ☐ One
2 ☐ Two
3 ☐ Three
4 ☐ Four
5 ☐ Five or more

Appendix E: Copy of Clinical Vignettes

Scenario #1: CT Scan *(medical error group 1, adverse event group 2)*

A physician is seeing a female patient who has a moderate cognitive impairment. She is complaining of lower back pain. He recommends that she undergo a CT scan of her back. However, his imaging request is electronically entered as a CT scan of her brain. The radiology technologist performs a CT scan of her brain, as requested. Upon seeing the results, the physician realizes that he ordered the wrong test and submits a new order for a CT scan of her back.

Scenario #2: Appendectomy *(adverse event group 2 and 3)*

An elderly female presents to the ED complaining of severe stomach pain, nausea, and vomiting. She is diagnosed with appendicitis and scheduled for an emergency appendectomy. While in pre-op, she gets out of bed to use the bathroom, falls, and breaks her right arm, resulting in a slight delay of her appendectomy surgery. During this delay, her appendix bursts, and subsequently, she develops an abscess. During the surgery to treat her abscess, she dies on the operating table.

Scenario #3: Gastrointestinal Bleed *(medical error group 3, adverse event group 2 and 3)*

A 62-year-old, male patient with diabetes and chronic renal insufficiency is admitted to the hospital with a new onset gastrointestinal bleed. He is made NPO for endoscopy. He demonstrates a high-level of anxiety about the procedure. Prior to the procedure, he is given diazepam to calm him. While waiting for the procedure, he gets out of bed to use the bathroom but is disoriented, falls, and fractures his left hip.

Scenario #4: Allergic Reaction *(adverse event group 1)*

A male patient with no known drug allergies develops a maculopapular rash, which is consistent with a drug allergy to a medication he has recently been prescribed. Immediately, his physician stops the medication and treats his rash. He responds well to treatment, and his rash resolves.

Scenario #5: Retained Sponge *(medical error group 1)*

A physician is seeing a female patient 3 weeks after an elective splenectomy for ITP. The splenectomy was technically challenging because of the patient's obesity, but seemed uncomplicated. During a follow-up visit, she complains of vague, persistent LUQ pain and is sent for an abdominal x-ray. The film shows a foreign body in her LUQ. She undergoes a subsequent operation to have it removed. A small piece of sponge, associated with the splenectomy, is subsequently removed from her abdomen. She makes a full recovery.

Scenario #6: Prostate Cancer *(medical error group 1)*

A urologist performs a needle biopsy on the prostate glands of two patients, John and Michael. The urologist correctly labels each specimen with the corresponding patient's identifying information and sends them to pathology for examination. Dr. Greene examines each specimen under a microscope and notes the presence of cancerous cells in John's sample. While Dr. Greene is entering the information into each patient's electronic medical record, she is interrupted by one of her assistants and enters the wrong information into each patient's file. After reviewing the pathology reports, the urologist tells John that he does not have cancer. He tells Michael that he does and recommends radiotherapy. A year later, John returns to the urologist, complaining of difficulty urinating, frequent urges to urinate at night, and weak stream. A needle biopsy suggests prostate cancer and an evaluation shows disease metastatic to bone.

Scenario #7: Breast Biopsies *(medical error group 3)*

A female patient's mammography results indicate that she has a suspicious lump in both of her breasts, so she is referred for a biopsy. A surgeon performs a biopsy on both breasts and sends the specimen to pathology. One of the samples indicates a malignancy. However, the specimens are not clearly labelled, so the pathologist is not sure which breast the tissue came from.

Scenario #8: Foot Amputation *(medical error group 2)*

A physician is treating a 70-year-old male patient with uncontrolled Type II diabetes. He has diabetic neuropathy, a diabetic foot ulcer on his right foot, and gangrene on his left foot. Due to the severity of the gangrene, the physician recommends that he have his foot amputated. During surgery, the patient's right foot is amputated, instead of his left.

Scenario #9: Shunt Revision *(adverse event group 1)*

During a car accident two years ago, Shannon, a 28-year-old female, suffered permanent, debilitating head and spinal cord injuries. Now, she is a paraplegic, requires a shunt to prevent increased cranial pressure, and uses a gastrostomy tube due to problems swallowing. Shannon is admitted to the hospital for a shunt revision and develops aspiration pneumonia.

Scenario #10: IV Infiltration *(adverse event group 2 and 3)*

A physician works on the medical-surgical unit of a small, rural hospital. One evening, a few of the unit's nurses call-in sick, leaving him and two nurse's aides caring for 16 patients. A young boy is admitted to the unit with a primary infection of oral herpes. His mouth has several large, painful lesions and he is dehydrated. He has not eaten or drunken much in the past 24 hours, so an IV is placed in his left arm. An hour later, the boy's mother presses the call button because she notices the area around the IV stick is

becoming swollen and cool to the touch. Due to the current staffing levels, the issue is not resolved for several hours.

Scenario #11: IV Mix-up *(medical error group 2 and 3, adverse event group 1)*

Ms. Jones has diabetes. She gets the flu (H1N1) and goes to the ER. There, she is stabilized before being transferred to the medical floor. There, Jackie, a nurse, reviews the ER physician's orders. She notes that an IV is ordered as NS at 150cc/hr. She checks the IV fluid and notices it is NS but set at a rate of 5cc/hr on the IV pump, so she sets it to 150cc/hr. But, the pump is not hooked up to a bag of NS. It is attached to a small 100 cc bag of insulin that is hanging behind
the bag of NS. Ms. Jones develops severe hypoglycemia and dies in the hospital.

Scenario #12: Hearing Loss *(adverse event group 3)*

Mr. Jenkins is admitted to the hospital with diagnoses of diabetes, renal disease, hypertension, and a foot infection. His physician cultures his foot wound, and after receiving the lab report, ordered several antibiotics, including Gentamicin Sulfate 60 mg IV q. 40 h. His physician orders a series of lab tests to assess his renal functioning and blood serum levels. However, the results are not closely monitored. Mr. Jenkins receives Gentamicin for three days and develops ototoxicity.

Scenario #13: Knee Replacement *(medical error group 3)*

Ms. Smith is an elderly female patient with osteoarthritis in both knees. She has had knee pain for a few years and has tried a variety of different treatments, including prescription NSAIDs, corticosteroid injections, and physical therapy. Since these treatments have not significantly decreased her pain, her physician recommends she undergo knee replacement surgery, starting with her left knee. Prior to surgery, she is asked to place a mark on the knee she is having surgery on, but labels the wrong knee. While preparing for surgery, the surgeon is called away to consult on an urgent case and asks a resident to start the surgery. The resident, not knowing the patient's history, starts operating on the wrong knee. When the surgeon returns, he notices that the resident is operating on the wrong knee.

Scenario #14: Birth Control *(adverse event group 2)*

A 35-year-old woman is using Nuva Ring. After a few months, she starts experiencing severe pain in her right calf. Also, her right leg is swollen, and she is having difficulty breathing. Concerned, she goes to the doctor, where she is diagnosed with deep vein thrombosis and a pulmonary embolism. Immediately, the doctor takes her off birth control and starts treating her with blood thinners.

Scenario #15: Chemotherapy *(medical error group 2)*

Georgia has breast cancer and is undergoing chemotherapy. During her first cycle of chemo, she spikes a high fever and experiences violent chills. Alarmed, she goes to the ED. Blood tests indicate that Georgia has a very low neutrophil count. She is diagnosed with febrile neutropenia and an infection. She is treated with intravenous antibiotics in the hospital's oncology ward.

Scenario #16: Leukemia *(medical error group 1)*

James is a 16-year-old patient with leukemia. For the past three months, he has been receiving chemotherapy. He has a central venous access device (CVAD) and alopecia. Recently, James was admitted to the hospital with a fever that did not respond to the acetaminophen his parents have been directed to give him. Blood tests indicate that he has anemia, neutropenia, and thrombocytopenia, which is attributed to the chemotherapy.

Scenario #17: Childhood Vaccination *(medical error group 2)*

Samantha and her 9-month-old daughter Emily recently moved to another state. Samantha takes Emily to a local physician for a well-child visit. Wanting to ensure that Emily is up-to-date on her immunizations, Samantha asks the doctor about childhood vaccinations and gives him a copy of her daughter's immunization card. While reviewing the card, he notices that she has not received her third Haemophilus influenzae type B shot and administers it. Shortly thereafter, he receives a copy of Emily's medical record from her previous pediatrician and notices that she had already received her third Hib shot.

Appendix F: Cover Letter for the Initial Mailing to the Mail Only Groups and Mail-Web Group

<insert date>

<insert physician's full name>
<insert organization>
<insert address Line 1>
<insert address Line 2>

Dear Dr. <insert physician's last name>:

My name is Lesley Weaver, and I am a doctoral student at the University of Minnesota, Twin Cities. For my dissertation, I am examining the factors that influence physicians' willingness to disclose <insert survey version> to patients and/or their families. Since you are a practicing physician, I am inviting you to participate in this study by completing the enclosed survey.

The following questionnaire will require approximately 25 minutes to complete. Four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet). Your participation in this research study is completely voluntary and you can refuse to participate at any time. Additionally, you can skip any questions you do not want to answer for any reason. If you choose to participate, please answer all questions to the best of your ability and promptly return it using the enclosed self-addressed stamped envelope.

Before completing the survey, I would like to assure you that all data collected as part of this study will be deidentified prior to data analysis and interpretation. No personally identifiable information will be associated with your responses in any reports or papers stemming from this study.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding the disclosure of <insert survey version>. Completing and returning this enclosed questionnaire will indicate your willingness to participate in this study.

If you have any questions or concerns about this study, please feel free to contact me or my dissertation adviser Todd Rockwood, Ph.D.. Our contact information is listed below.

To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online at www.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you very much for your time and cooperation.

Sincerely,

Lesley Weaver, M.P.P.
weav0095@umn.edu
Cell: (612) 656-9389

Todd Rockwood, Ph.D.
rockw001@umn.edu
Office: (612) 625-3993

Appendix G: Reminder Letter for First Follow-up Mailing to the Mail Only and Mail-web Groups

<insert date>

<insert physician's full name>
<insert organization>
<insert address Line 1>
<insert address Line 2>

Dear Dr. <insert physician's last name>:

A few weeks ago, I sent you a letter that asked you to participate in my survey on the factors that influences physicians' willingness to disclose <survey_version> to patients and their families. To the best of my knowledge, it has not been returned.

To date, the results indicate that physicians are in a very precarious situation with many competing demands that they must balance when dealing with the disclosure of «survey_version». While these results suggest that physicians must navigate a complex process, it is important that I hear from nearly everyone in my sample to ensure that my results are truly representative of Minnesota physicians' views on disclosure. Therefore, I am asking that you take the time to fill out and return the enclosed questionnaire.

The survey should take approximately 20 minutes to complete. As a token of my appreciation, four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet) at the end of the study. Your participation in this study is completely voluntary, and you can skip any questions you do not want to answer for any reason.

This study is being conducted confidentially. During data collection, I will know whether you have returned the survey, but all links between your personal information and the data will be destroyed prior to data analysis.

The University of Minnesota's Institutional Review Board has approved this study. If you have any questions about this study, please contact me or my dissertation adviser. Our contact information is listed below.

To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online at www.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you for your participation!

Lesley Weaver, M.P.P.
weav0095@umn.edu
(612) 656-9389

Todd Rockwood, Ph.D.
rockw001@umn.edu
(612) 625-3993

Appendix H: Reminder Letter for Second Follow-up Mailing to the Mail Only Groups

<insert date>

<insert physician's full name>
<insert organization>
<insert address Line 1>
<insert address Line 2>

Dear Dr. <insert physician's last name>:

In recent weeks, I have sent you a letter asking you, as part of a random sample of currently practicing Minnesota physicians, to let me know your thoughts on the disclosure of <insert survey version> to patients and their families. I plan to start summarizing the results within the next month or two, so I hope that all surveys will be completed by then.

For your convenience, I have enclosed a paper copy of the survey. You can help me by filling it out and returning it in the envelope provided. For many years, policy makers, accrediting organizations, and health systems have been talking about and developing disclosure policies and guidelines. I hope that this study will contribute to these conversations and provide insight into Minnesota physicians' views on disclosure.

The survey should take approximately 20 minutes to complete. Your participation in this study is completely voluntary, and you can skip any questions you do not want to answer for any reason. At the end of the study, four participants will be randomly selected to receive a tablet of their choice (approximate value $500 per tablet).

This study is being conducted confidentially. During data collection, I will know whether you have returned the survey, but all links between your personal information and the data will be destroyed prior to data analysis.

If you have any questions about this study, please contact me via phone or email at (612) 656-9389 or weav0095@umn.edu.

The University of Minnesota's Institutional Review Board has approved this study. To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online at www.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Many thanks for considering this request.

Respectfully and with appreciation,

Lesley Weaver, M.P.P.

Part 1: Legal Considerations

Q1. To what extent do each of the following encourage or discourage you from doing the following:

	STRONGLY ENCOURAGES	SOMEWHAT ENCOURAGES	SOMEWHAT DISCOURAGES	STRONGLY DISCOURAGES
a. My malpractice insurer _____ me from doing or saying anything that could be construed as an admission of legal liability (e.g. disclosing medical errors to patients and/or their families).	☐1	☐2	☐3	☐4
b. The health system I work for _____ me from doing or saying anything that could be construed as an admission of legal liability (e.g. disclosing medical errors to patients and/or their families).	☐1	☐2	☐3	☐4

Q2. Disclosing harmful medical errors to patients and/or their families will make them:

1 ☐ Much more likely to sue
2 ☐ Somewhat more likely to sue
3 ☐ Somewhat less likely to sue
4 ☐ Much less likely to sue

Q3. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. If disclosing harmful medical errors was not related to malpractice risk, it would be easier for me to disclose them to patients and/or their families.	☐1	☐2	☐3	☐4

Part 2: Human Fallibility

Q4. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. Disclosing medical errors will negatively affect a provider's career.	☐1	☐2	☐3	☐4

Q5. Disclosing medical errors to my patients and/or their families would have the following impact on my professional reputation: *Circle the number that best represents your answer.*

1 2 3 4 5 6 7 8 9 10

A Substantial Negative Impact — **A Substantial Positive Impact**

Q6. How much easier would it be for you to disclose medical errors to each of the following if there was no potential for stigmatization associated with disclosing them:

	NOT AT ALL EASIER	A LITTLE EASIER	SOMEWHAT EASIER	MUCH EASIER
a. Your patients and/or their families	☐1	☐2	☐3	☐4
b. Your colleagues	☐1	☐2	☐3	☐4
c. The health system you work for	☐1	☐2	☐3	☐4

Q7. How humiliated does having to admit to patients and/or their families that you made a mistake make you feel? *Circle the number that best represents your answer.*

1	2	3	4	5	6	7	8	9	10
Not at All									**Extremely**

Part 3: Practice Culture

Q8. **In your workplace**, how often does each of the following occur:

	NEVER	RARELY	SOMETIMES	FREQUENTLY	ALL THE TIME
a. Direct care providers (e.g. physicians, nurses) freely speak up when they see something that could negatively affect patient safety.	☐1	☐2	☐3	☐4	☐5
b. Direct care providers (e.g. physicians, nurses) are informed of problems that affect patient safety.	☐1	☐2	☐3	☐4	☐5
c. Direct care providers (e.g. physicians, nurses) discuss ways to prevent patient safety problems from happening again.	☐1	☐2	☐3	☐4	☐5

Q9. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. In my workplace, direct care providers (e.g. physicians, nurses) feel like their mistakes are held against them.	☐1	☐2	☐3	☐4
b. In my workplace, it is difficult for me to speak up when I perceive a problem with patient safety.	☐1	☐2	☐3	☐4
c. When I have patient safety concerns, my colleagues encourage me to report them to the appropriate personnel (e.g. my supervisor, risk managers, patient safety advocates, etc.).	☐1	☐2	☐3	☐4
d. My supervisor/manager seriously considers my suggestions for improving patient safety.	☐1	☐2	☐3	☐4
e. In my workplace, it is easy for me to learn from others' mistakes.	☐1	☐2	☐3	☐4
f. In my workplace, reporting medical errors to the institution (e.g. risk managers, patient safety advocates, etc.) is considered an important component of patient safety.	☐1	☐2	☐3	☐4
g. In my workplace, the lack of supportive forums for and policies regarding the disclosure of medical errors prevents me from disclosing them to patients and/or their families.	☐1	☐2	☐3	☐4

Q10. **In your workplace**, how often are each of the following reported to the organization when they occur:

	NEVER	RARELY	SOMETIMES	USUALLY
a. Near misses	☐1	☐2	☐3	☐4
b. Medical errors that have ***no potential*** to harm patients	☐1	☐2	☐3	☐4
c. Medical errors that ***could potentially*** harm patients but don't	☐1	☐2	☐3	☐4
d. Medical errors that cause patients ***mild harm***	☐1	☐2	☐3	☐4
e. Medical errors that cause patients ***moderate harm***	☐1	☐2	☐3	☐4
f. Medical errors that cause patients ***serious harm***	☐1	☐2	☐3	☐4

Q11. **In your workplace**, how often does the following occur:

	NEVER	RARELY	SOMETIMES	USUALLY
a. Medical errors, regardless of their potential to cause harm or the harm actually caused, are disclosed to patients and/or their families.	☐1	☐2	☐3	☐4

Q12. How easy or difficult does the culture of your workplace make each of the following?

	VERY EASY	SOMEWHAT EASY	SOMEWHAT DIFFICULT	VERY DIFFICULT
a. Disclosing medical errors to patient safety employees, such as risk managers	☐1	☐2	☐3	☐4
b. Disclosing medical errors to your colleagues	☐1	☐2	☐3	☐4
c. Disclosing medical errors to patients and/or their families	☐1	☐2	☐3	☐4

Part 4: Professional Ethics

Q13. How strongly do you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. The need to disclose medical errors to patients and/or their families is a proportionate one—it increases as the harm or risk of harm to the patient increases.	☐[1]	☐[2]	☐[3]	☐[4]

Q14. How likely or unlikely would you be to disclose the following to one of ***your*** patients and/or their families, if it was to occur:

	UNLIKELY									LIKELY
a. A near miss	1	2	3	4	5	6	7	8	9	10
b. A medical error that has ***no potential*** *to harm* the patient	1	2	3	4	5	6	7	8	9	10
c. A medical error that could ***potentially harm*** the patient but do not	1	2	3	4	5	6	7	8	9	10
d. A medical error that causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
e. A medical error that causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
f. A medical error that causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Q15. How likely or unlikely would you be to disclose the following to one of ***your*** patients and/or their families, if it was to occur:

	UNLIKELY									LIKELY
A medical error that is **not readily apparent** to the patient and										
a. Has ***no potential to harm*** the patient	1	2	3	4	5	6	7	8	9	10
b. Could ***potentially harm*** the patient but does not	1	2	3	4	5	6	7	8	9	10
c. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
d. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
e. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10
A medical error that is **readily apparent** to the patient and										
f. Has ***no potential to harm*** the patient	1	2	3	4	5	6	7	8	9	10
g. Could ***potentially harm*** the patient but does not	1	2	3	4	5	6	7	8	9	10
h. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
i. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
j. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Q16. While some medical errors are readily apparent to patients, others are not as readily apparent. At what point does the apparentness of a medical error influence your willingness to disclose it to patients and/or their families?

1	2	3	4	5	6	7	8	9	10
Not at All Apparent									**Readily Apparent**

Q17. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. When medical errors occur, I disclose them to patients and/or their families because that is the way I would like to be treated if I were in their shoes.	☐[1]	☐[2]	☐[3]	☐[4]
b. I take responsibility for my actions when they have a serious, adverse impact on patients' health and well-being.	☐[1]	☐[2]	☐[3]	☐[4]
c. Disclosing medical errors is the right thing to do, even if it comes at a significant personal or professional cost.	☐[1]	☐[2]	☐[3]	☐[4]

Part 5: Self-efficacy

Q18. Next, I'd like to ask you about any training on disclosing medical errors you have received.

	NONE	A LITTLE	SOME	A LOT	A GREAT DEAL
a. How much education or training on disclosing medical errors to patients and/or their families have you received?	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]
b. How much experience do you have disclosing medical errors to patients and/or their families?	☐[1]	☐[2]	☐[3]	☐[4]	☐[5]

Q19. How comfortable or uncomfortable would you feel disclosing the following to one of ***your*** patients and/or their families, if it was to occur:

	COMFORTABLE									UNCOMFORTABLE
A medical error that is **not readily apparent** to the patient and										
a. Has ***no potential to harm*** the patient	1	2	3	4	5	6	7	8	9	10
b. Could ***potentially harm*** the patient but does not	1	2	3	4	5	6	7	8	9	10
c. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
d. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
e. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10
A medical error that is **readily apparent** to the patient and										
f. Has ***no potential to harm*** the patient	1	2	3	4	5	6	7	8	9	10
g. Could ***potentially harm*** the patient but does not	1	2	3	4	5	6	7	8	9	10
h. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
i. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
j. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Part 6: Clinical Scenarios

In this section, you will be presented with a series of clinical vignettes. Please read each vignette carefully and answer the corresponding questions.

Q20. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0 1 2 3 4 5 6 7 8 9 10
Not Readily Apparent **Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1 2 3 4 5 6 7 8 9 10
Highly Unlikely **Highly Likely**

e. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1] ☐[2] ☐[3] ☐[4]
Very likely **Likely** **Unlikely** **Very unlikely**

Q21. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0 1 2 3 4 5 6 7 8 9 10
Not Readily Apparent **Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1 2 3 4 5 6 7 8 9 10
Highly Unlikely **Highly Likely**

e. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1] ☐[2] ☐[3] ☐[4]
Very likely **Likely** **Unlikely** **Very unlikely**

Q22. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0 1 2 3 4 5 6 7 8 9 10
Not Readily Apparent **Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1 2 3 4 5 6 7 8 9 10
Highly Unlikely **Highly Likely**

e. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1] ☐[2] ☐[3] ☐[4]
Very likely **Likely** **Unlikely** **Very unlikely**

Q23. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0 1 2 3 4 5 6 7 8 9 10
Not Readily Apparent **Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1 2 3 4 5 6 7 8 9 10
Highly Unlikely **Highly Likely**

e. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1] ☐[2] ☐[3] ☐[4]

Very likely **Likely** **Unlikely** **Very unlikely**

Part 7: About You…

Q24. Please select your sex.

1 ☐ Male 2 ☐ Female

Q265. Do you consider yourself Hispanic, Latino, or Latina?

1 ☐ Yes 2 ☐ No

Q26. What is your race? *Check all that apply.*

1 ☐ Caucasian
2 ☐ African American
3 ☐ American Indian or Alaskan Native
4 ☐ Asian or Pacific Islander
5 ☐ Other (please specify): _____

Q27. How old are you?

|___|___| Years

Q28. What is your primary area of practice/specialty? Please specify.
_____

Q29. How many years have you been practicing medicine?

|___|___| Years

Q30. In which zip code, do you primarily practice?

|___|___|___|___|___|

Q31. Please specify what percentage of your time is spent in each of the following:

E. Clinical care	|___|___|___|%
F. Hospital care	|___|___|___|%
G. Research	|___|___|___|%
H. Other	|___|___|___|%
Total	100%

Q32. Have you ever provided medical testimony in a legal deposition that was related to medical malpractice?

1 ☐ Yes
2 ☐ No

Q33. Have you ever been named as a defendant in a medical malpractice lawsuit?

1 ☐ Yes
2 ☐ No

Q34. How many malpractice claims have been filed against you?

0 ☐ Zero
1 ☐ One
2 ☐ Two
3 ☐ Three
4 ☐ Four
5 ☐ Five or more

Part 1: Legal Considerations

Q1. To what extent do each of the following encourage or discourage you from doing the following:

	STRONGLY ENCOURAGES	SOMEWHAT ENCOURAGES	SOMEWHAT DISCOURAGES	STRONGLY DISCOURAGES
a. My malpractice insurer _____ me from doing or saying anything that could be construed as an admission of legal liability (e.g. disclosing adverse events to patients and/or their families).	☐1	☐2	☐3	☐4
b. The health system I work for _____ me from doing or saying anything that could be construed as an admission of legal liability (e.g. disclosing adverse events to patients and/or their families).	☐1	☐2	☐3	☐4

Q2. Disclosing adverse events to patients and/or their families will make them:

1 ☐ Much more likely to sue
2 ☐ Somewhat more likely to sue
3 ☐ Somewhat less likely to sue
4 ☐ Much less likely to sue

Q3. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. If disclosing adverse events was not related to malpractice risk, it would be easier for me to disclose them to patients and/or their families.	☐[1]	☐[2]	☐[3]	☐[4]

Part 2: Human Fallibility

Q4. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. Disclosing adverse events will negatively affect a provider's career.	☐[1]	☐[2]	☐[3]	☐[4]

Q5. Disclosing adverse events to my patients and/or their families would have the following impact on my professional reputation: *Circle the number that best represents your answer.*

1	2	3	4	5	6	7	8	9	10
A Substantial Negative Impact									**A Substantial Positive Impact**

Q6. How much easier would it be for you to disclose adverse events to each of the following if there was no potential for stigmatization associated with disclosing them:

	NOT AT ALL EASIER	A LITTLE EASIER	SOMEWHAT EASIER	MUCH EASIER
a. Your patients and/or their families	☐1	☐2	☐3	☐4
b. Your colleagues	☐1	☐2	☐3	☐4
c. The health system you work for	☐1	☐2	☐3	☐4

Q7. How humiliated does having to admit to patients and/or their families that you made a mistake make you feel? *Circle the number that best represents your answer.*

1 2 3 4 5 6 7 8 9 10
Not at All **Extremely**

Part 3: Practice Culture

Q8. **In your workplace**, how often does each of the following occur:

	NEVER	RARELY	SOMETIMES	FREQUENTLY	ALL THE TIME
a. Direct care providers (e.g. physicians, nurses) freely speak up when they see something that could negatively affect patient safety.	☐1	☐2	☐3	☐4	☐5
b. Direct care providers (e.g. physicians, nurses) are informed of problems that affect patient safety.	☐1	☐2	☐3	☐4	☐5
c. Direct care providers (e.g. physicians, nurses) discuss ways to prevent patient safety problems from happening again.	☐1	☐2	☐3	☐4	☐5

Q9. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. In my workplace, direct care providers (e.g. physicians, nurses) feel like their mistakes are held against them.	☐1	☐2	☐3	☐4
b. In my workplace, it is difficult for me to speak up when I perceive a problem with patient safety.	☐1	☐2	☐3	☐4
c. When I have patient safety concerns, my colleagues encourage me to report them to the appropriate personnel (e.g. my supervisor, risk managers, patient safety advocates, etc.).	☐1	☐2	☐3	☐4
d. My supervisor/manager seriously considers my suggestions for improving patient safety.	☐1	☐2	☐3	☐4
e. In my workplace, it is easy for me to learn from others' mistakes.	☐1	☐2	☐3	☐4
f. In my workplace, the procedures and systems that are in place are good at preventing adverse events from happening.	☐1	☐2	☐3	☐4
g. In my workplace, the lack of supportive forums for and policies regarding the disclosure of adverse events prevents me from disclosing them to patients and/or their families.	☐1	☐2	☐3	☐4

Q10. **<u>In your workplace</u>**, how often are each of the following reported to the organization when they occur:

	NEVER	RARELY	SOMETIMES	USUALLY
a. Adverse events that cause patients ***mild harm***	☐1	☐2	☐3	☐4
b. Adverse events that cause patients ***moderate harm***	☐1	☐2	☐3	☐4
c. Adverse events that cause patients ***serious harm***	☐1	☐2	☐3	☐4

Q11. **<u>In your workplace</u>**, how often does the following occur:

	NEVER	RARELY	SOMETIMES	USUALLY
a. Adverse events, regardless of the severity of the harm they cause, are disclosed to patients and/or their families.	☐1	☐2	☐3	☐4

Q12. How easy or difficult does the culture of your workplace make each of the following?

	VERY EASY	SOMEWHAT EASY	SOMEWHAT DIFFICULT	VERY DIFFICULT
a. Disclosing adverse events to patient safety employees, such as risk managers	☐1	☐2	☐3	☐4
b. Disclosing adverse events to your colleagues	☐1	☐2	☐3	☐4
c. Disclosing adverse events to patients and/or their families	☐1	☐2	☐3	☐4

Part 4: Professional Ethics

Q13. How strongly do you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. The need to disclose adverse events to patients and/or their families is a proportionate one—it increases as the harm or risk of harm to the patient increases.	☐1	☐2	☐3	☐4

Q14. How likely or unlikely would you be to disclose the following to one of ***your*** patients and/or their families, if it was to occur:

	UNLIKELY									LIKELY
a. An adverse event that causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
b. An adverse event that causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
c. An adverse event that causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Q15. How likely or unlikely would you be to disclose the following to one of ***your*** patients and/or their families, if it was to occur:

	UNLIKELY									LIKELY
An adverse event that is **not readily apparent** to the patient and										
a. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
b. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
c. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10
An adverse event that is **readily apparent** to the patient and										
d. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
e. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
f. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Q16. While some adverse events are readily apparent to patients, others are not as readily apparent. At what point does the apparentness of an adverse event influence your willingness to disclose it to patients and/or their families?

1	2	3	4	5	6	7	8	9	10
Not at All Apparent									**Readily Apparent**

Q17. Please rate how strongly you agree or disagree with the following statements:

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE
a. When adverse events occur, I disclose them to patients and/or their families because that is the way I would like to be treated if I were in their shoes.	☐1	☐2	☐3	☐4
b. I take responsibility for my actions when they have a serious, adverse impact on patients' health and well-being.	☐1	☐2	☐3	☐4
c. Disclosing adverse events is the right thing to do, even if it comes at a significant personal or professional cost.	☐1	☐2	☐3	☐4

Part 5: Self-efficacy

Q18. Next, I'd like to ask you about any training on disclosing adverse events you have received.

	NONE	A LITTLE	SOME	A LOT	A GREAT DEAL
a. How much education or training on disclosing adverse events to patients and/or their families have you received?	☐1	☐2	☐3	☐4	☐5
b. How much experience do you have disclosing adverse events to patients and/or their families?	☐1	☐2	☐3	☐4	☐5

Q19. How comfortable or uncomfortable would you feel disclosing the following to one of ***your*** patients and/or their families, if it was to occur:

	COMFORTABLE									UNCOMFORTABLE
An adverse event that is **not readily apparent** to the patient and										
a. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
b. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
c. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10
An adverse event that is **readily apparent** to the patient and										
d. Causes ***mild harm***	1	2	3	4	5	6	7	8	9	10
e. Causes ***moderate harm***	1	2	3	4	5	6	7	8	9	10
f. Causes ***serious harm***	1	2	3	4	5	6	7	8	9	10

Part 6: Clinical Scenarios

In this section, you will be presented with a series of clinical vignettes. Please read each vignette carefully and answer the corresponding questions.

Q20. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	1	2	3	4	5	6	7	8	9	10
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q21. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	1	2	3	4	5	6	7	8	9	10
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q22. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	1	2	3	4	5	6	7	8	9	10
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. If disclosed, how likely is this event to result in a malpractice lawsuit?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Q23. *Randomly assigned vignette*

a. Would you classify the event being described as a medical error, adverse event, or something else?

1 ☐ Medical error
2 ☐ Adverse event
3 ☐ Something else (please specify):
_____

b. What level of harm, if any, did the patient sustain?

1 ☐ Unknown
2 ☐ None
3 ☐ Mild
4 ☐ Moderate
5 ☐ Severe
6 ☐ Death

c. How apparent would this event be to the patient?

0	1	2	3	4	5	6	7	8	9	10
Not Readily Apparent										**Readily Apparent**

d. If this was your patient, how likely would you be to disclose what happened to the patient and/or their family?

1	2	3	4	5	6	7	8	9	10
Highly Unlikely									**Highly Likely**

e. How likely is this event to result in a malpractice suit, if disclosed?

☐[1]	☐[2]	☐[3]	☐[4]
Very likely	**Likely**	**Unlikely**	**Very unlikely**

Part 7: About You…

Q24. Please select your sex.

1 ☐ Male 2 ☐ Female

Q25. Do you consider yourself Hispanic, Latino, or Latina?

1 ☐ Yes 2 ☐ No

Q26. What is your race? *Check all that apply.*

1 ☐ Caucasian
2 ☐ African American
3 ☐ American Indian or Alaskan Native
4 ☐ Asian or Pacific Islander
5 ☐ Other (please specify): _____

Q27. How old are you?

|___|___| Years

Q28. What is your primary area of practice/specialty? Please specify.

_____

Q29. How many years have you been practicing medicine?

|___|___| Years

Q30. In which zip code, do you primarily practice?

|___|___|___|___|___|

Q31. What percentage of your time is spent on each of the following:

A. Clinical care	|___|___|___|%
B. Hospital care	|___|___|___|%
C. Research	|___|___|___|%
D. Other	|___|___|___|%
Total	100%

Q32. Have you ever provided medical testimony in a legal deposition that was related to medical malpractice?

1 ☐ Yes
2 ☐ No

Q33. Have you ever been named as a defendant in a medical malpractice lawsuit?

1 ☐ Yes
2 ☐ No

Q34. How many malpractice claims have been filed against you?

0 ☐ Zero
1 ☐ One
2 ☐ Two
3 ☐ Three
4 ☐ Four
5 ☐ Five or more

Appendix K: Cover Letter for the Initial Email Contact with Web Only and Web-Mail Groups

Dear Dr. <insert physician's last name>:

My name is Lesley Weaver, and I am a doctoral student at the University of Minnesota, Twin Cities. For my dissertation, I am examining the factors that influence physicians' willingness to disclose medical errors and adverse events to patients and/or their families. Since you are a practicing physician, I am writing to request your participation in a web survey.

The survey should take approximately 25 minutes to complete. Four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet). Your participation in this research study is completely voluntary and you can refuse to participate at any time. Additionally, you can skip any questions you do not want to answer for any reason. If you choose to participate, please click the link below or copy and paste the link into your Internet browser.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Your participation in this research study is completely voluntary. All your responses will be kept confidential. All of the information collected as part of this study will be deidentified prior to data analysis and interpretation. No personally identifiable information will be associated with your responses in any reports or papers stemming from this study. Completing and submitting the survey indicates your willingness to participate in this study.

The University of Minnesota Institutional Review Board has approved this study. If you have any questions or concerns about this study, please feel free to contact me or my dissertation adviser Todd Rockwood, Ph.D. Our contact information is listed below.

To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online atwww.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you very much for your time and cooperation.

Sincerely,

Lesley Weaver, M.P.P.

weav0095@umn.edu
Cell: (612) 656-9389

Todd Rockwood, Ph.D.
rockw001@umn.edu
Office: (612) 625-3993

Follow the link to opt out of future emails:
<insert opt out link>

Appendix L: Reminder Letter for First Follow-up with Web Only and Web-mail Groups

Dear Dr. <insert physician's last name>:

At this point in time, it is critical to understand what physicians think about disclosure. Health systems and insurers are starting to set disclosure guidelines and policies, and often these are developed without considering what the physician community thinks about what should be disclosed. This study will help the physician community understand how they as a group feel about and perceive disclosure, which can be used to influence how policies are developed by agents external to the physician community.

A little over a week ago, I sent you an email asking you to participate in this survey, which is for my dissertation research. You were randomly selected from a list of all licensed Minnesota physicians. The value of this survey for my research and the physician community is directly proportional to the number of individuals who were randomly selected to complete the survey. Given the importance of this issue, please make the time to complete my survey, which should take approximately 20 minutes to complete. I recognize that this seems like a long time, but disclosure is a complex issue, and I have made the survey as short as I possibly can.

As a token of my appreciation, four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet) at the end of the study. Your participation in this study is completely voluntary. You can skip any questions you do not want to answer for any reason. If you choose to participate, please click the link below or copy and paste it into your Internet browser.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

This study is being conducted confidentially. During the fieldwork, I will know whether you have responded to the survey, but all links between your personal information and the data will be destroyed. Thus, the analytic dataset will be completely anonymous.

The University of Minnesota's Institutional Review Board has approved this study. If you have any questions or concerns about this study, please feel free to contact me or my dissertation adviser. Our contact information is listed below. To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online atwww.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you very much for your time and cooperation.

Sincerely,

Lesley Weaver, M.P.P.
weav0095@umn.edu

Todd Rockwood, Ph.D.
rockw001@umn.edu
Office: (612) 625-3993

Follow the link to opt out of future emails:
<insert opt-out link>

Appendix M: Reminder Letter for Second Follow-up with Web Only Group

Dear Dr. ${m://LastName}:

At this point in time, it is critical to understand what physicians think about disclosure. Health systems and insurers are starting to set disclosure guidelines and policies, and often these are developed without considering what the physician community thinks about what should be disclosed. This study will help the physician community understand how they as a group feel about and perceive disclosure, which can be used to influence how policies are developed by agents external to the physician community.

A little over a week ago, I sent you an email asking you to participate in this survey, which is for my dissertation research. You were randomly selected from a list of all licensed Minnesota physicians. The value of this survey for my research and the physician community is directly proportional to the number of individuals who were randomly selected to complete the survey. Given the importance of this issue, please make the time to complete my survey, which should take approximately 20 minutes to complete. I recognize that this seems like a long time, but disclosure is a complex issue, and I have made the survey as short as I possibly can.

As a token of my appreciation, four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet) at the end of the study. Your participation in this study is completely voluntary. You can skip any questions you do not want to answer for any reason. If you choose to participate, please click the link below or copy and paste it into your Internet browser.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

This study is being conducted confidentially. During the fieldwork, I will know whether you have responded to the survey, but all links between your personal information and the data will be destroyed. Thus, the analytic dataset will be completely anonymous.

The University of Minnesota's Institutional Review Board has approved this study. If you have any questions or concerns about this study, please feel free to contact me or my dissertation adviser. Our contact information is listed below. To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online atwww.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you very much for your time and cooperation.

Sincerely,

Lesley Weaver, M.P.P.
weav0095@umn.edu

Todd Rockwood, Ph.D.
rockw001@umn.edu
Office: (612) 625-3993

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix N: Reminder Letter for Third Follow-up with Web Only Group

Dear Dr. ${m://LastName}:

A few weeks ago, I sent you an email asking you to participate in my dissertation research. I am conducting a statewide survey of physicians to better understand the factors that influence their willingness to disclose medical errors and adverse events to patients and their families. My records indicate that you have not completed the survey, so I am writing again to request your participation.

You have been randomly selected to receive this survey because you are currently practicing medicine in Minnesota. Your participation will help me accurately represent the views of physicians on disclosure.

As a token of my appreciation, four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet) at the end of the study. Your participation in this study is completely voluntary, and the questionnaire should take about 20 minutes to complete. You can skip any questions you do not want to answer for any reason. If you choose to participate, please click the link below or copy and paste it into your Internet browser.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

This study is being conducted confidentially. During data collection, I will know whether you have responded to the survey, but all links between your personal information and the data will be destroyed prior to data analysis.

The University of Minnesota's Institutional Review Board has approved this study. If you have any questions about this study, please contact me or my dissertation adviser. Our contact information is listed below. To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online at www.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you for your participation!

Lesley Weaver, M.P.P.
weav0095@umn.edu

Todd Rockwood, Ph.D.
rockw001@umn.edu

Office: (612) 625-3993

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix O: Reminder Letter for Second Follow-up with Web-mail Group (Letter Only)

November 28, 2017

«AddressBlock»

Dear Dr. «LastName»:

I few weeks ago, I sent you an email inviting you to participate in my dissertation research. I am conducting a statewide survey of physicians to better understand the factors that influence their willingness to disclose «survey_version» to patients and their families.

You have been randomly selected to receive this important survey because you are currently practicing medicine in Minnesota. Your participation will help me accurately represent the views of physicians on disclosure.

As a token of my appreciation, four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet) at the end of the study. Your participation in this study is completely voluntary, and the questionnaire should take about 20 minutes to complete. You can skip any questions you do not want to answer for any reason. If you choose to participate enter the link below into your browser and it will take you to the survey.

Survey link: «Link»

This study is being conducted confidentially. During data collection, I will know whether you have responded to the survey, but all links between your personal information and the data will be destroyed prior to data analysis.

The University of Minnesota's Institutional Review Board has approved this study. If you have any questions about this study, please contact me at 612.656.9389 or my dissertation adviser. Our contact information is listed below. To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online at www.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you for your participation!

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Appendix P: Reminder Letter for Second Follow-up with Web-mail Group (Survey Packet Group)

November 28, 2017

Dr. «AddressBlock»

Dear Dr. «LastName»:

A few weeks ago, I sent you an email inviting you to participate in my dissertation research. **To date, results indicate that physicians are in a very precarious situation with many competing demands that they must balance when dealing with the disclosure of «survey_version».**

While the preliminary results suggest that physicians must navigate a complex process, it is important that I hear from all randomly selected physicians to understand what the physician community in Minnesota is confronting when disclosing «survey_version» to patients and their families. Health systems, insurers, and accrediting organizations are starting to set disclosure guidelines and policies. The results of this study could help ensure that physicians' views are taken into consideration when these guidelines and policies are being developed.

As a token of my appreciation, four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet) at the end of the study. Your participation in this study is completely voluntary, and you can skip any questions you do not want to answer for any reason. This study is being conducted confidentially. During data collection, I will know whether you have responded to the survey, but all links between your personal information and the data will be destroyed prior to data analysis.

The University of Minnesota's Institutional Review Board has approved this study. If you have any questions about this study, please contact me at 612.656.9389 or my dissertation adviser. Our contact information is listed below. To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online at www.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you for your participation!

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Appendix Q: Reminder Letter for Final Follow-up with Web-Mail Group

<insert date>

<insert full name>
<insert address line 1>
<insert address line 2>
<insert city, state zip code>

Dear Dr. <insert last name>:

In recent weeks, I have sent you an email asking you, as part of a random sample of currently practicing Minnesota physicians, to let me know your thoughts on the disclosure of < insert survey version> to patients and their families. I plan to start summarizing the results within the next month or two, so I hope that all surveys will be completed by then.

For your convenience, I have enclosed a paper copy of the survey. You can help me by filling it out and returning it in the envelope provided. For many years, policy makers, accrediting organizations, and health systems have been talking about and developing disclosure policies and guidelines. I hope that this study will contribute to these conversations and provide insight into Minnesota physicians' views on disclosure.

The survey should take approximately 20 minutes to complete. Your participation in this study is completely voluntary, and you can skip any questions you do not want to answer for any reason. At the end of the study, four participants will be randomly selected to receive a tablet of their choice (approximate value $500 per tablet).

This study is being conducted confidentially. During data collection, I will know whether you have returned the survey, but all links between your personal information and the data will be destroyed prior to data analysis.

If you have any questions about this study, please contact me via phone or email at (612) 656-9389 or weav0095@umn.edu.

The University of Minnesota's Institutional Review Board has approved this study. To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online at www.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Many thanks for considering this request.

Respectfully and with appreciation,

Lesley Weaver, M.P.P.

Appendix R: Final Reminder Letter for Mail-Web Group

Dear Dr. ${m://LastName}:

Over a month ago, I sent you a letter asking for your thoughts on the disclosure of${e://Field/survey_version} to patients and their families. To the best of my knowledge, I have not received your response. Given current national initiatives aimed at increasing disclosure, my hope is that you will provide your thoughts and opinions on this important issue.

I am writing again because of the importance that your responses have for helping me obtain accurate results. It is only by hearing from nearly everyone in the sample that I can be sure that my results are truly representative of the beliefs and values of physicians currently practicing in Minnesota. I would greatly appreciate your help in this endeavor.

For your convenience, I am giving you the opportunity to complete the survey online. The survey will take approximately 20 minutes to complete.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

As a token of my appreciation, four participants will be randomly selected to receive an iPad or Android tablet of their choice (approximate value $500 per tablet) at the end of the study. Your participation in this study is completely voluntary, and you can skip any questions you do not want to answer for any reason.

This study is being conducted confidentially. During data collection, I will know whether you have returned the survey, but all links between your personal information and the data will be destroyed prior to data analysis.

If you have any questions about this study, please contact me via phone or email at (612) 656-9389 or weav0095@umn.edu.

The University of Minnesota's Institutional Review Board has approved this study. To share feedback privately about your research experience, including any concerns about the study, call the Research Participants Advocate Line: (612) 625-1650 or give feedback online at www.irb.umn.edu/report.html. You may also contact the Human Research Protection Program in writing at D528 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455.

Thank you so much for your help with this very important issue.

Sincerely,

Lesley Weaver, M.P.P.
Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}