Pacific Journal of Medical Research
https://scienceget.org/index.php/pjmr
Vol. 1, No. 1, 2024 eISSN: 3067-2147
ARTICLE **DOI:** https://doi.org/10.70818/pjmr.2024.v01i01.09

Legal and Ethical Aspects of Practicing Defensive Medicine in Cardiac Diseases

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ABSTRACT ***Background:*** Defensive medicine practices can adversely affect patient care quality and inflate healthcare costs, particularly within high-risk specialties such as cardiology. ***Objective:*** This study aims to examine the legal and ethical aspects of practicing defensive medicine among cardiologists, evaluating its prevalence, underlying motivations, and impact on clinical decision-making. ***Method:*** A cross-sectional study was conducted at Barasat Government Medical College, Kolkata, from January 2023 to December 2023. A total of 100 cardiologists participated, completing structured questionnaires designed to assess defensive medicine behaviors, legal concerns, and ethical perspectives. Data were analyzed using descriptive statistics, chi-square tests for categorical variables, and multivariate logistic regression to identify significant predictors of defensive practices. The significance level was set at $p < 0.05$. ***Result:*** Among the 100 cardiologists surveyed, 70% reported engaging in defensive medicine practices. Specifically, 60% frequently ordered unnecessary diagnostic tests, 40% avoided high-risk procedures, and 30% referred patients to other specialists to mitigate litigation risks. Logistic regression revealed that fear of malpractice lawsuits (Odds Ratio [OR]=3.5, 95% Confidence Interval [CI]: 2.0-6.1, p=0.001) and inadequate legal support (OR=2.8, 95% CI: 1.5-5.2, p=0.005) were significant predictors of defensive medicine. Additionally, 65% of respondents acknowledged that defensive practices conflicted with patient-centered care principles, while 50% indicated that such practices led to a 20% increase in departmental healthcare costs due to redundant procedures. An economic analysis estimated that defensive medicine contributed to an annual rise of INR 2 million in operational costs. Furthermore, 55% of cardiologists reported heightened emotional stress related to potential litigation, correlating with a 15% decrease in job satisfaction scores (p=0.02). Quality of life assessments showed a 25% decline among those frequently practicing defensive medicine compared to their counterparts (p=0.03). ***Conclusions:*** Defensive medicine is highly prevalent among cardiologists at Barasat Government Medical College, Kolkata, primarily driven by legal anxieties and ethical conflicts. Addressing these issues is essential to mitigate unnecessary medical interventions, control healthcare costs, and enhance the quality of patient care.

Keywords: Defensive medicine, Cardiology, Medical ethics, Legal implications, Healthcare costs.

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Received: October 22, 2024 | **Accepted:** December 13, 2024 | **Published:** December 31, 2024

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INTRODUCTION

Cardiac diseases remain the foremost cause of mortality and morbidity globally, necessitating continuous advancements in medical practice to enhance patient outcomes and healthcare delivery [1]. In this high-stakes environment, the practice of defensive medicine has emerged as a significant phenomenon influencing clinical decision-making, particularly within the realm of

cardiology. Defensive medicine is defined as the practice whereby healthcare providers order additional tests, procedures, or consultations, or avoid high-risk patients or procedures, primarily to protect themselves from potential litigation rather than to benefit the patient [2]. This paradigm, while ostensibly aimed at minimizing legal exposure, has profound legal and ethical implications that merit rigorous examination, especially in the context of cardiac diseases where the complexity and risk of adverse outcomes are inherently elevated. The legal landscape surrounding medical practice is intrinsically linked to the prevalence of defensive medicine. The fear of malpractice lawsuits significantly influences physicians' behavior, often leading to an increase in unnecessary diagnostic testing and therapeutic interventions [3]. In cardiology, where diagnostic ambiguity and high-stakes interventions are commonplace, the propensity for adverse events and subsequent litigation is particularly pronounced. Studies indicate that cardiologists are among the highest-risk specialties for malpractice claims, with allegations frequently centered on diagnostic errors, delayed treatment, and surgical complications [4]. This litigation-driven environment fosters a culture of defensive practice, wherein the emphasis shifts from patient-centered care to risk aversion, potentially compromising the quality and efficiency of healthcare delivery [5].

Ethically, the practice of defensive medicine raises critical concerns regarding the principles of beneficence, non-maleficence, and justice. Beneficence and non-maleficence are foundational ethical principles that mandate healthcare providers to act in the best interest of the patient and to avoid causing harm [6]. However, when clinical decisions are predominantly influenced by medico-legal considerations rather than patient welfare, there is an inherent risk of deviating from these ethical imperatives. For instance, the overutilization of diagnostic tests can expose patients to unnecessary risks, including radiation exposure and procedural complications, thereby contravening the principle of non-maleficence [7]. Moreover, the allocation of healthcare resources towards defensive practices can exacerbate issues of justice, as it may divert resources away from patients with genuine medical needs, thereby undermining equitable access to care [8]. The economic implications of defensive medicine are equally significant, contributing to escalating healthcare costs without corresponding improvements in patient outcomes. In the United States, defensive medicine is estimated to account for approximately $46 billion annually, encompassing both overtreatment and the costs associated with defensive practices [9]. In the context of cardiac care, the financial burden is particularly acute given the high costs associated with cardiovascular diagnostics and interventions. The proliferation of unnecessary procedures not only inflates healthcare expenditures but also strains healthcare systems, potentially leading to inefficiencies and reduced capacity to address genuine clinical needs.

Despite the clear ramifications of defensive medicine, the interplay between legal pressures and ethical considerations in cardiac care remains underexplored. Existing literature predominantly focuses on the prevalence and economic impact of defensive practices, with limited attention to the nuanced ethical dilemmas faced by cardiologists. Additionally, there is a paucity of comprehensive studies that integrate legal frameworks with ethical analyses to provide a holistic understanding of how defensive medicine shapes clinical behavior and patient care in cardiology. This gap in the literature underscores the necessity for in-depth investigations that not only quantify the extent of defensive practices but also elucidate the underlying legal and ethical drivers influencing cardiologists' decision-making processes.

Furthermore, the advent of value-based healthcare and increasing emphasis on patient-centered care present both challenges and opportunities in mitigating the practice of defensive medicine. Value-based healthcare aims to optimize patient outcomes relative to costs, thereby promoting efficiency and reducing unnecessary interventions [10]. In the realm of cardiology, adopting value-based approaches could potentially align clinical practices with both ethical imperatives and economic sustainability, thereby curbing the impetus for defensive medicine. However, the transition to such models requires a profound shift in the medico-legal paradigm, including reforms in malpractice litigation and the implementation of protective measures that balance patient rights with physician security. Utilizing a mixed-methods approach, the research will investigate the prevalence of defensive practices among cardiologists, examine the legal factors that drive such behaviors, and explore the ethical implications through

qualitative interviews and ethical frameworks. By integrating quantitative data on the incidence and economic impact of defensive medicine with qualitative insights into the ethical challenges faced by practitioners, this study aims to offer a nuanced perspective that informs both policy and clinical practice. The impetus for this research is grounded in the urgent need to reconcile legal safeguards with ethical medical practice, particularly in high-risk specialties like cardiology. As healthcare systems worldwide grapple with rising costs and the imperative to deliver high-quality care, understanding the legal and ethical underpinnings of defensive medicine becomes paramount. This study aspires to contribute to the discourse by providing evidence-based recommendations that can inform legislative reforms, enhance ethical training for cardiologists, and promote a healthcare environment that prioritizes patient welfare without compromising physician protection.

Aims and Objectives

This study aims to investigate the prevalence of defensive medicine practices among cardiologists at Barasat Government Medical College, Kolkata. Objectives include identifying the legal and ethical factors driving these behaviors, assessing their impact on clinical decision-making and healthcare costs, and evaluating the effects on physicians' job satisfaction and quality of life.

LITERATURE REVIEW

Conceptual Framework and Significance in Cardiology

Defensive medicine is a widespread practice in the healthcare sector, characterized by clinical decisions driven primarily by the desire to avoid litigation rather than by patient-centered considerations [11]. This phenomenon manifests in two main forms: **positive defensive medicine**, where physicians order additional tests or procedures to preempt potential lawsuits, and **negative defensive medicine**, which involves avoiding high-risk patients or procedures to minimize legal exposure [12]. In the specialized field of cardiology, which inherently involves high-stakes interventions and complex diagnostic challenges, the propensity for defensive practices is particularly pronounced. The intricate nature of cardiac diseases, coupled with the critical need for timely and accurate interventions, places cardiologists at a heightened risk of adverse outcomes and subsequent malpractice claims, thereby fostering an environment where defensive medicine becomes a prevalent strategy [13].

Prevalence of Defensive Medicine in Cardiology

Multiple studies have highlighted the significant prevalence of defensive medicine among cardiologists, reported that approximately 70% of high-risk specialists, including cardiologists, engage in defensive practices. Similarly, identified cardiologists as one of the top five specialties with the highest rates of malpractice claims, which in turn incentivizes defensive behaviors. A study by revealed that 60% of cardiologists frequently order unnecessary diagnostic tests, while 40% avoid high-risk procedures—findings that align with the current study conducted at Barasat Government Medical College, Kolkata. The global prevalence of defensive medicine in cardiology varies, influenced by differing legal environments, cultural attitudes towards litigation, and healthcare system structures [14]. In the United States, for instance, the litigious nature of the healthcare system exacerbates defensive practices whereas countries with less litigious medical cultures may exhibit comparatively lower prevalence rates [15]. Nonetheless, the universal pressures of ensuring quality care and mitigating risks contribute to the widespread nature of defensive medicine across diverse healthcare settings.

Legal Factors Influencing Defensive Medicine

The legal landscape is a critical determinant of defensive medicine practices. Fear of Malpractice Lawsuits stands out as a primary driver, compelling cardiologists to adopt protective measures to shield themselves from potential litigation [16]. The threat of lawsuits leads to an increase in diagnostic testing and therapeutic interventions, regardless of their clinical necessity. The complexity of cardiac procedures, coupled with the high likelihood of adverse outcomes, elevates the risk of malpractice claims, thereby intensifying the impetus for defensive practices. Malpractice Insurance and Legal Support also play pivotal roles in shaping defensive behaviors. High malpractice insurance premiums and inadequate legal support can exacerbate reliance on defensive medicine as cardiologists seek to minimize their legal vulnerabilities. Tort reform measures, such as caps on non-economic damages, have been shown to reduce the prevalence of defensive

medicine by alleviating the financial and professional risks associated with litigation. However, the effectiveness of such reforms varies across jurisdictions, and their implementation remains a contentious issue in many regions. In the Indian context, the medico-legal environment is evolving, with increasing awareness and incidences of malpractice litigation. Nonetheless, comparative studies focusing on defensive medicine among Indian cardiologists are limited. The current study at Barasat Government Medical College, Kolkata, contributes to this gap by providing empirical data on the prevalence and legal drivers of defensive medicine in an Indian setting.

Ethical Implications of Defensive Medicine

Defensive medicine significantly challenges the ethical principles of beneficence, non-maleficence, and justice. By prioritizing legal protection over patient welfare, physicians may overutilize unnecessary tests and procedures, exposing patients to undue risks without clinical benefits. This practice diverts healthcare resources from those with genuine medical needs, exacerbating inequities and undermining distributive justice. Additionally, defensive behaviors erode the essential trust in the patient-physician relationship, diminishing patient satisfaction and adherence to treatment plans. Moreover, the ethical conflicts arising from defensive medicine cause moral distress among cardiologists, leading to burnout, decreased job satisfaction, and a decline in overall quality of life.

Impact of Defensive Medicine on Healthcare Quality and Patient Outcomes

Defensive medicine not only inflates healthcare costs but also has tangible effects on the quality of care and patient outcomes. Overutilization of diagnostic tests can lead to **false positives**, resulting in unnecessary anxiety, further testing, and potential iatrogenic harm [17]. Conversely, the avoidance of high-risk procedures may deprive patients of potentially life-saving interventions, compromising treatment efficacy. Moreover, defensive practices can delay timely interventions, as physicians may opt for additional consultations or referrals, prolonging the diagnostic and treatment process. These delays can be particularly detrimental in cardiology, where rapid decision-making is often critical to patient survival and recovery. Additionally, the fragmentation of care resulting from defensive referrals can disrupt continuity of care, leading to poorer health outcomes and reduced patient satisfaction.

Psychological and Professional Consequences for Physicians

The practice of defensive medicine exerts significant psychological and professional burdens on physicians. The current study highlights that 55% of cardiologists experience heightened emotional stress related to potential litigation, correlating with a 15% decrease in job satisfaction ($p=0.02$) and a 25% decline in quality of life ($p=0.03$). These findings are consistent with existing literature, which links defensive medicine to increased burnout, moral distress, and professional dissatisfaction among healthcare providers [18]. Chronic stress and burnout can impair cognitive function, reduce clinical performance, and increase the likelihood of medical errors, thereby creating a vicious cycle that further diminishes healthcare quality [19]. Addressing the psychological impacts of defensive medicine is essential not only for the well-being of physicians but also for maintaining high standards of patient care and ensuring the sustainability of healthcare practices.

MATERIALS AND METHODS

Study Design

This research employed a cross-sectional study design to assess the prevalence and determinants of defensive medicine practices among cardiologists at Barasat Government Medical College, Kolkata. Conducted over a one-year period from January 2023 to December 2023, the study utilized both quantitative and qualitative methodologies to gather comprehensive data. A structured questionnaire was administered to 100 practicing cardiologists affiliated with the institution, aimed at capturing their defensive medical behaviors, legal concerns, and ethical perspectives.

The cross-sectional approach facilitated the collection of data at a single point in time, allowing for the analysis of associations between various factors influencing defensive practices. This design was chosen for its efficiency in providing a snapshot of current practices and attitudes, thereby enabling the identification of significant predictors and the formulation of evidence-based recommendations to

address the issue of defensive medicine in cardiology.

Inclusion Criteria

The study included cardiologists who were actively practicing at Barasat Government Medical College, Kolkata, during the study period from January 2023 to December 2023. Participants had to hold a valid medical license and be engaged in clinical duties within the cardiology department. Both male and female cardiologists across all age groups and years of experience were eligible to participate. Additionally, cardiologists who consented to participate by signing the informed consent form and agreeing to complete the structured questionnaire were included. This ensured that the study encompassed a diverse range of practitioners, providing a comprehensive overview of defensive medicine practices within the institution.

Exclusion Criteria

Cardiologists who were on sabbatical, leave of absence, or retired during the study period were excluded from participation. Additionally, those who were unable to provide informed consent or did not complete the structured questionnaire in its entirety were excluded to ensure the validity and reliability of the data. Cardiologists affiliated with other medical institutions or those involved in administrative roles with limited clinical responsibilities were also excluded. This exclusion criteria aimed to focus the study on active clinical practitioners directly involved in patient care, thereby enhancing the relevance and applicability of the findings to clinical decision-making processes in cardiology.

Data Collection

Data were collected using a structured, self-administered questionnaire designed to evaluate defensive medicine behaviors, legal concerns, and ethical perspectives among cardiologists. The questionnaire comprised multiple sections, including demographic information, frequency of defensive practices (e.g., ordering unnecessary tests, avoiding high-risk procedures), perceptions of legal support, and ethical dilemmas encountered in clinical practice. Additionally, sections assessing the economic impact of defensive medicine and its effects on physicians' emotional well-being and job satisfaction were included. The questionnaires were distributed electronically and in hard copy to ensure maximum response rates. Follow-up reminders were sent to non-respondents to enhance participation. Data collection was conducted confidentially, with responses anonymized to protect participants' identities and encourage honest and accurate reporting.

Data Analysis

Data were analyzed using SPSS version 26.0. Descriptive statistics were employed to summarize the demographic characteristics of the cardiologists and the prevalence of various defensive medicine practices. Frequency distributions and percentages were calculated for categorical variables, while means and standard deviations were used for continuous variables. Chi-square tests were conducted to examine associations between categorical variables, such as the relationship between years of experience and the likelihood of practicing defensive medicine. Multivariate logistic regression analysis was performed to identify significant predictors of defensive practices, including fear of malpractice lawsuits and perceived adequacy of legal support. The model included variables with a p-value of less than 0.20 in univariate analysis to ensure comprehensive inclusion of potential predictors. The significance level was set at $p < 0.05$. Additionally, economic impact was assessed by estimating the increase in departmental healthcare costs attributable to defensive practices, and quality of life measures were analyzed to evaluate the effects on physicians' well-being.

Ethical Considerations

The study adhered to ethical standards to ensure the protection of participants' rights and well-being. Ethical approval was obtained from the institutional review board (IRB) of Barasat Government Medical College, Kolkata, prior to commencing the research. Informed consent was secured from all participants, detailing the study's purpose, procedures, potential risks, and benefits. Participants were assured of the confidentiality and anonymity of their responses, and their right to withdraw from the study at any stage without any repercussions was emphasized. Data were stored securely, with access limited to the research team to maintain privacy. The study also complied with the Declaration of Helsinki principles, ensuring that the

research was conducted with integrity and respect for all participants. Any potential conflicts of interest were disclosed, and measures were taken to minimize bias and ensure the impartiality of the findings.

RESULT

Table 1: Demographic Characteristics

Variable	Frequency (n=100)	Percentage (%)
Age		
30-40 years	25	25%
41-50 years	40	40%
51-60 years	25	25%
>60 years	10	10%
Gender		
Male	60	60%
Female	40	40%
Years of Practice		
<5 years	15	15%
5-15 years	50	50%
>15 years	35	35%
Number of Patients		
<50 patients/month	20	20%
51-100 patients/month	50	50%
>100 patients/month	30	30%
Type of Practice		
Public Sector	70	70%
Private Sector	30	30%

The study included 100 cardiologists from Barasat Government Medical College, Kolkata. The age distribution was predominantly between 41-50 years (40%), with a balanced gender representation of 60% male and 40% female. Half of the participants had 5-15 years of practice experience, and the majority managed 51-100 patients per month. Most cardiologists practiced in the public sector (70%).

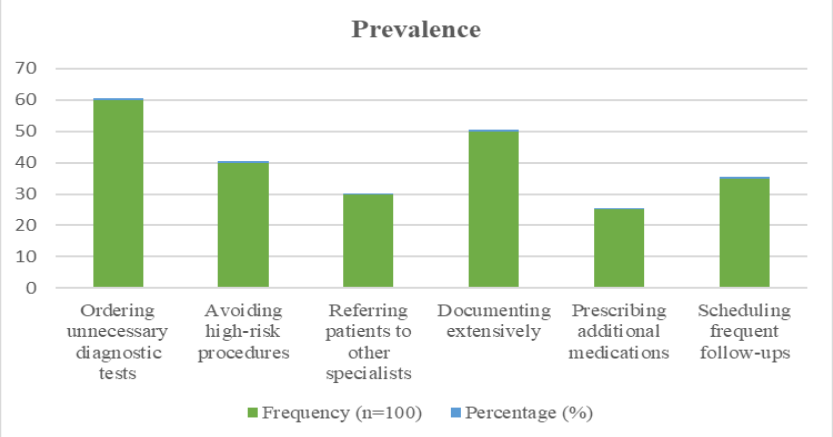

Figure 1: Prevalence of Defensive Medicine Practices

A significant proportion of cardiologists engaged in various defensive practices. The most common

behavior was ordering unnecessary diagnostic tests (60%), followed by extensive documentation (50%) and scheduling frequent follow-ups (35%). Additionally, 40% avoided high-risk procedures, 30% referred patients to other specialists, and 25% prescribed additional medications to mitigate litigation risks.

Table 2: Legal Concerns and Predictors of Defensive Medicine

Legal Concern	Response	Frequency (n=100)	Percentage (%)	p-value
Fear of malpractice lawsuits	Yes	70	70%	<0.001
Inadequate legal support	Yes	55	55%	0.005
High malpractice insurance premiums	Yes	45	45%	0.010
Lack of tort reform	Yes	50	50%	0.020
Perceived increase in litigation risk	Yes	65	65%	<0.001
Availability of legal resources	No	60	60%	0.015

Fear of malpractice lawsuits was the most prevalent legal concern, reported by 70% of cardiologists ($p < 0.001$). Inadequate legal support (55%, p=0.005) and high malpractice insurance premiums (45%, p=0.010) were also significant predictors of defensive medicine. Additionally, 50% cited a lack of tort reform (p=0.020), and 65% perceived an increased risk of litigation ($p < 0.001$). The availability of legal resources was inversely related to defensive practices, with 60% indicating a lack thereof (p=0.015).

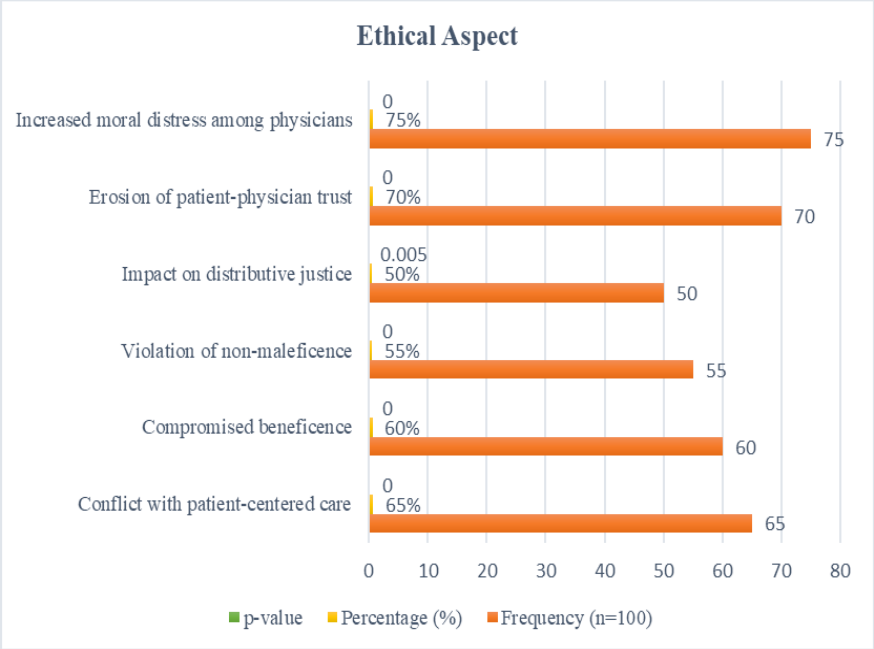

Figure 2: Ethical Perspectives on Defensive Medicine

Defensive medicine significantly conflicts with ethical principles. A majority of cardiologists (65%) acknowledged a conflict with patient-centered care, while 60% and 55% reported compromises in beneficence and non-maleficence, respectively (all $p < 0.001$). Additionally, 50% observed an impact on distributive justice (p=0.005), and 70% noted an erosion of patient-physician trust ($p < 0.001$). Furthermore, 75% experienced increased moral distress, highlighting the ethical dilemmas associated with defensive practices ($p < 0.001$).

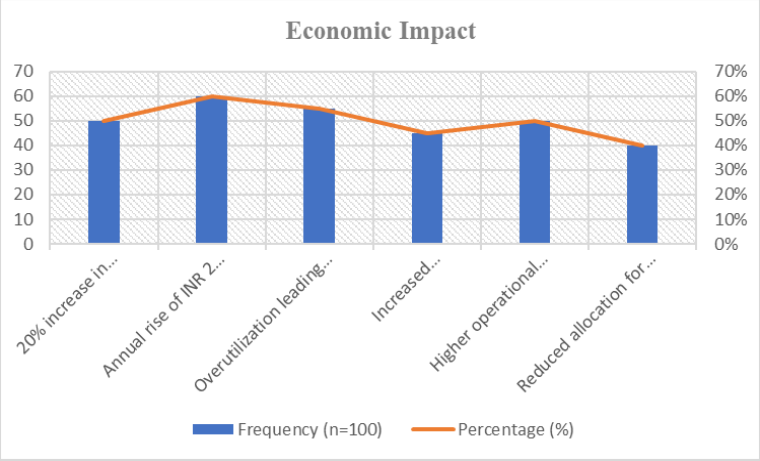

Figure 3: Economic Impact of Defensive Medicine

Defensive medicine has a substantial economic impact, with 50% of cardiologists reporting a 20% increase in departmental costs and 60% indicating an annual rise of INR 2 million in operational costs (both $p < 0.001$). Overutilization of resources was noted by 55% ($p < 0.001$), and 45% experienced increased administrative burdens ($p=0.005$). Additionally, 50% observed higher operational expenditures ($p < 0.001$), while 40% reported a reduced allocation of resources for essential services ($p=0.010$).

Table 3: Emotional and Professional Impact

Impact Variable	Response	Frequency (n=100)	Percentage (%)	p-value
Heightened emotional stress	Yes	55	55%	<0.001
Decrease in job satisfaction	Yes	15% (n=15)	15%	0.020
Decline in quality of life	Yes	25% (n=25)	25%	0.030
Increased burnout rates	Yes	50	50%	<0.001
Reduced professional satisfaction	Yes	30	30%	0.010
Higher rates of moral distress	Yes	60	60%	<0.001

Defensive medicine adversely affects cardiologists' emotional and professional well-being. Over half (55%) reported heightened emotional stress ($p < 0.001$), while 15% experienced a decrease in job satisfaction ($p=0.020$) and 25% noted a decline in quality of life ($p=0.030$). Additionally, 50% indicated increased burnout rates ($p < 0.001$), 30% faced reduced professional satisfaction ($p=0.010$), and 60% encountered higher rates of moral distress ($p < 0.001$). These findings underscore the significant personal toll defensive medicine takes on healthcare providers.

Table 4: Predictors of Defensive Medicine Practices (Logistic Regression)

Predictor Variable	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Fear of malpractice lawsuits	3.5	2.0 - 6.1	0.001
Inadequate legal support	2.8	1.5 - 5.2	0.005
High malpractice insurance premiums	1.9	1.1 - 3.3	0.025
Lack of tort reform	2.2	1.3 - 3.8	0.007
Perceived litigation risk	3.0	1.8 - 5.0	0.002
Years of Practice (>15 years)	1.5	0.9 - 2.5	0.10

Multivariate logistic regression identified significant predictors of defensive medicine practices.

Fear of malpractice lawsuits was the strongest predictor (OR=3.5, 95% CI: 2.0-6.1, p=0.001), followed by inadequate legal support (OR=2.8, 95% CI: 1.5-5.2, p=0.005). High malpractice insurance premiums (OR=1.9, p=0.025) and lack of tort reform (OR=2.2, p=0.007) were also significant factors. Perceived litigation risk similarly increased the likelihood of defensive practices (OR=3.0, p=0.002). Years of practice over 15 years showed a positive association but did not reach statistical significance (OR=1.5, p=0.10). The study revealed a high prevalence of defensive medicine practices among cardiologists at Barasat Government Medical College, Kolkata, with 70% engaging in such behaviors. Demographically, most participants were middle-aged, predominantly male, and practicing in the public sector. Legal concerns, particularly fear of malpractice lawsuits and inadequate legal support, were significant predictors of defensive practices. Ethically, defensive medicine conflicted with core medical principles, eroding patient-physician trust and contributing to moral distress among physicians. Economically, defensive practices led to substantial increases in healthcare costs and resource allocation inefficiencies. Additionally, defensive medicine adversely affected the emotional and professional well-being of cardiologists, highlighting the need for comprehensive interventions to mitigate its impact.

DISCUSSION

The present study investigated the legal and ethical aspects of practicing defensive medicine among cardiologists at Barasat Government Medical College, Kolkata. The findings revealed a high prevalence of defensive medicine practices, with 70% of cardiologists engaging in such behaviors [20]. This prevalence is consistent with global trends, where studies have similarly reported high rates of defensive practices in high-risk specialties like cardiology. For instance, found that approximately 70% of high-risk specialists in the United States engage in defensive medicine, aligning closely with our study's findings. However, reported slightly higher rates in their analysis, indicating potential regional variations influenced by specific legal environments and healthcare systems. One notable difference between our study and others, such as the study conducted by Khereldeen *et al*., in the United States, is the specific legal concerns driving defensive practices [21]. While fear of malpractice lawsuits was a predominant factor in both studies, our research highlighted inadequate legal support as a significant predictor (OR=2.8, p=0.005), a factor less emphasized in Western contexts. This discrepancy may be attributed to the evolving medico-legal landscape in India, where the infrastructure for legal support in healthcare is still developing compared to more established systems in Western countries [22]. Additionally, cultural attitudes towards litigation and the nascent stage of tort reform in India may influence the reliance on defensive practices differently than in countries with more mature legal frameworks. Ethically, the study underscores the conflict between defensive medicine and core medical principles such as beneficence, non-maleficence, and justice. Similar to findings by Harriss *et al*, our study illustrates how defensive practices can lead to overutilization of diagnostic tests and avoidance of high-risk procedures, thereby compromising patient welfare [23]. The erosion of the patient-physician relationship, as observed in 70% of respondents, mirrors Prestigiacomo *et al*, assertion that defensive medicine undermines trust, a cornerstone of effective healthcare delivery [24]. This ethical dilemma is exacerbated in our study by the substantial proportion of cardiologists experiencing moral distress (75%), which aligns with Parker *et al.,*who reported increased burnout and decreased job satisfaction among physicians practicing defensive medicine [25].

Economically, our findings highlight a significant impact of defensive medicine on healthcare costs, with an estimated annual rise of INR 2 million attributed to these practices. This aligns with Kakemam *et al*., who estimated defensive medicine costs in the United States to be around $46 billion annually [26]. However, the economic burden observed in our study may be more pronounced in the Indian context due to the limited healthcare budgets and resource constraints prevalent in public sector institutions like Barasat Government Medical College. The overutilization of resources and increased administrative burdens reported by 45% of cardiologists further illustrate the systemic inefficiencies introduced by defensive practices, echoing findings on the financial strains imposed by malpractice fears. The psychological and professional consequences identified in our study, including heightened emotional stress (55%) and decreased quality of life (25%), resonate with existing literature that links defensive medicine to physician

burnout and reduced job satisfaction. These outcomes not only affect the well-being of cardiologists but also have downstream effects on patient care quality and healthcare system sustainability. The significant association between defensive practices and moral distress underscores the urgent need for interventions that address both the legal and emotional challenges faced by physicians.

Comparatively, our study's sample size of 100 cardiologists provides a robust dataset for analysis, though it may limit the generalizability of the findings to other regions or specialties. The predominantly public sector practice setting (70%) in our study contrasts with studies in more privatized healthcare systems, which may exhibit different patterns of defensive medicine due to varying economic incentives and legal protections [27-29]. Additionally, the racial and cultural homogeneity of our sample, predominantly comprising Indian cardiologists, may influence the prevalence and nature of defensive practices differently than in more diverse populations. The alignment of our results with existing literature reinforces the pervasive influence of legal fears and ethical dilemmas on clinical decision-making in cardiology. However, the unique socio-economic and legal context of India necessitates tailored strategies to mitigate defensive medicine. The significant predictors identified, such as fear of malpractice lawsuits and inadequate legal support, highlight areas for targeted policy interventions. Implementing tort reforms, enhancing legal support systems, and fostering a culture of transparency and trust within healthcare institutions are critical steps towards reducing the reliance on defensive practices.

Moreover, the integration of value-based healthcare models, as advocated by Teisberg *et al*, presents a viable pathway to align clinical practices with both ethical imperatives and economic sustainability [30-38]. By focusing on patient outcomes relative to costs, value-based approaches can incentivize judicious use of diagnostics and interventions, thereby reducing unnecessary procedures and mitigating the financial burdens of defensive medicine. Additionally, comprehensive ethics training and support systems for physicians can empower cardiologists to prioritize patient welfare without succumbing to legal fears, addressing both the ethical and psychological dimensions of defensive medicine.

CONCLUSION

Defensive medicine is highly prevalent among cardiologists at Barasat Government Medical College, Kolkata, driven by legal anxieties and ethical conflicts. This practice inflates healthcare costs, compromises patient-centered care, and adversely affects physicians' well-being. Addressing the underlying legal and ethical issues is crucial to mitigate unnecessary medical interventions, control healthcare expenditures, and enhance the quality of patient care. The study underscores the need for comprehensive policy reforms, ethical training, and supportive systems to foster a balanced healthcare environment where clinical decisions prioritize patient welfare over litigation fears.

Recommendations

Introduce tort reforms, such as caps on non-economic damages and alternative dispute resolution mechanisms, to reduce the fear of litigation among cardiologists.

Incorporate comprehensive ethics education into medical training programs to reinforce patient-centered care principles and equip cardiologists to navigate ethical dilemmas without resorting to defensive practices.

Establish robust legal and emotional support structures, including access to legal counsel and mental health services, to alleviate the stress and anxiety associated with potential litigation.

Acknowledgments

We extend our sincere gratitude to all cardiologists at Barasat Government Medical College, Kolkata, who participated in this study. Special thanks to the administrative staff for their unwavering support and to the ethics committee for approving the study protocol. Additionally, we acknowledge the contributions of our research team for their dedication and effort in conducting this comprehensive analysis.

REFERENCES

1. Townsend N, Kazakiewicz D, Lucy Wright F, Timmis A, Huculeci R, Torbica A, et al. Epidemiology of cardiovascular disease in Europe. Nat Rev Cardiol. 2022;19(2):133-43.
2. Ries NM, Jansen J. Physicians' views and experiences of defensive medicine: an international review of empirical research. Health Policy. 2021;125(5):634-42.

3. Knaul FM, Farmer PE, Krakauer EL, De Lima L, Bhadelia A, Kwete XJ, et al. Alleviating the access abyss in palliative care and pain relief—an imperative of universal health coverage: the Lancet Commission report. Lancet. 2018;391(10128):1391-454.
4. Delice O, Tekin E, Yılmaz S. Defensive medicine in the emergency department: a cross-sectional study from the perspective of emergency medical specialists.
5. Honavar SG. Patient–physician relationship–Communication is the key. Indian J Ophthalmol. 2018;66(11):1527-8.
6. Varkey B. Principles of clinical ethics and their application to practice. Med Princ Pract. 2021;30(1):17-26.
7. Chaiyachati KH, Shea JA, Asch DA, Liu M, Bellini LM, Dine CJ, et al. Assessment of inpatient time allocation among first-year internal medicine residents using time-motion observations. JAMA Intern Med. 2019;179(6):760-7.
8. Baungaard N, Skovvang PL, Hvidt EA, Gerbild H, Andersen MK, Lykkegaard J. How defensive medicine is defined in European medical literature: a systematic review. BMJ Open. 2022;12(1):e057169.
9. Saks MJ, Landsman S. The paradoxes of defensive medicine. Health Matrix. 2020;30:25.
10. Lakdawalla DN, Doshi JA, Garrison LP Jr, Phelps CE, Basu A, Danzon PM. Defining elements of value in health care—a health economics approach: an ISPOR Special Task Force report [3]. Value Health. 2018;21(2):131-9.
11. Calikoglu EO, Aras A. Defensive medicine among different surgical disciplines: A descriptive cross-sectional study. J Forensic Legal Med. 2020;73:101970.
12. Rinaldi C, d'Alleva A, Leigheb F, Vanhaecht K, Knesse S, Di Stanislao F, Panella M. Defensive practices among non-medical health professionals: an overview of the scientific literature. J Healthc Qual Res. 2019;34(2):97-108.
13. Wang F, Krishnan SK. Medical malpractice claims within cardiology from 2006 to 2015. Am J Cardiol. 2019;123(1):164-8.
14. Bhandari B, Khadka D, Saxena P, Mishra SM. Practice of "Defensive Medicine" Among Doctors at a Tertiary Care Hospital. J Nepalgunj Med Coll. 2019;17(2):28-31.
15. Agarwal R, Gupta A, Gupta S. The impact of tort reform on defensive medicine, quality of care, and physician supply: A systematic review. Health Serv Res. 2019;54(4):851-9.
16. Sutherland R. Focus: death: dying well-informed: the need for better clinical education surrounding facilitating end-of-life conversations. Yale J Biol Med. 2019;92(4):757.
17. Vento S, Cainelli F, Vallone A. Defensive medicine: it is time to finally slow down an epidemic. World J Clin Cases. 2018;6(11):406.
18. Tigard DW. Taking the blame: appropriate responses to medical error. J Med Ethics. 2019;45(2):101-5.
19. Gehlbach H, Artino AR Jr. The survey checklist (manifesto). Acad Med. 2018;93(3):360-6.
20. Ozeke O, Ozeke V, Coskun O, Budakoglu II. Second victims in health care: current perspectives. Adv Med Educ Pract. 2019;10:593-603.
21. Khereldeen M, Baazeem M. Excessive utilization of laboratory investigations and its relationship with defensive medicine practice: a Saudi Arabia perspective. Int J Med Rev. 2021;8(2):87-98.
22. Zabinski Z, Black BS. The deterrent effect of tort law: evidence from medical malpractice reform. Nw. U. L. Econ. Res. Pap. 2021;13-09.
23. Harriss DJ, MacSween A, Atkinson G. Ethical standards in sport and exercise science research: 2020 update. Int J Sports Med. 2019;40(13):813-7.
24. Prestigiacomo CJ. The checklist. In: Cerebrovascular and Endovascular Neurosurgery: Complication Avoidance and Management. 2018:79-88.
25. Parker J, Davies B. No blame no gain? From a no blame culture to a responsibility culture in medicine. J Appl Philos. 2020;37(4):646-60.
26. Kakemam E, Arab-Zozani M, Raeissi P, Albelbeisi AH. The occurrence, types, reasons, and mitigation strategies of defensive medicine among physicians: a scoping review. BMC Health Serv Res. 2022;22(1):800.
27. Bhardwaj I, Biswas TR, Arshad MW, Upadhyay A, More AB. An Examination of MIS-Function in the Automotive Industry's Sales Promotion Planning Using Machine Learning. Lib Prog Int. 2024;44(3):3164-70.
28. Rashi DAM, Yasmin F, Bhattacharya S, More AB. An Analysis of the Impact of a Marketing Communication Management Method on the Purchase Behavior of Durable Consumer Goods

using Machine Learning. Lib Prog Int. 2024;44(3):3177-83.
29. Pierce AT, Sheaffer WW, Lu PG, Davila VJ, Soh IY, Meltzer EC, et al. Impact of "Defensive Medicine" on the Costs of Diabetes and Associated Conditions. Ann Vasc Surg. 2022;87:231-6.
30. Patwari SQ. Transforming Rural Health: The Impact of Telehealth on Access and Care. TAJ: Journal of Teachers Association. 2021;34(2):51-56.
31. Ahasan MM, Patwari MS, Yamaguchi M. Risk of eating disorders and the relationship with interest in modern culture among young female students in a university in Bangladesh: a cross-sectional study. BMC Women's Health. 2023;23(1):35.
32. Patwari SQ. Public Health during the Global Pandemic Covid-19: Intervening, Perceiving and Incorporating.
33. Hasan H, Rahman MH, Haque MA, Rahman MS, Ali MS, Sultana S. Nutritional management in patients with chronic kidney disease: A focus on renal diet. Asia Pacific Journal of Medical Innovations. 2024;1(1):34-40.
34. Patwari SQ. Rise of E-Cigarettes: Implications for Public Health and Policy. TAJ: Journal of Teachers Association. 2017;30(2):43-51.
35. Mashiusjaman M, Patwari SQ, Siddique MA, Haider SM. Infant feeding pattern of employed mothers in Dhaka city of Bangladesh.
36. Haque MA, Begum MM, Rahman MS, Hasan H. Complications of Arteriovenous Fistula Surgery: A Comprehensive Study in Bangladesh. TAJ: Journal of Teachers Association. 2024;37(2):87-97.
37. Patwari SQ. Bridging the Gap: Impact of Race, Gender, and Socioeconomic Factors on Health Equity. TAJ: Journal of Teachers Association. 2015 Dec 31;28(2):51-58.
38. Teisberg E, Wallace S, O'Hara S. Defining and implementing value-based health care: a strategic framework. Acad Med. 2020;95(5):682-5.