Original Article

Defensive medicine in surgical disciplines: attitudes and practices among faculty and residents at Iran University of Medical Sciences

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Abstract

Defensive medicine, driven by fear of litigation, increases healthcare costs and physician stress, particularly in high-risk specialties such as surgery. This study investigates the attitudes and practices of faculty members and residents in surgical discipline regarding defensive medicine.

In this cross-sectional study, 147 surgeons (faculty, residents, and fellows) from IUMS teaching hospitals completed a validated questionnaire assessing attitudes toward the ethicality of defensive medicine and the prevalence of defensive practices. Data were analyzed using SPSS version 24, applying chi-square tests, independent t-tests, and Mann-Whitney U tests.

Nearly half of the participants (48.9%) considered defensive practices ethical. Common defensive behaviors included consultation referrals (47.6%), unnecessary laboratory tests (36.7%), and avoidance of high-risk procedures (44.3%). Key concerns driving defensive practices were non-expert judicial rulings (35.4%), stress related to high-risk patients (34.7%), and litigation costs (35.2%). Factors such as intervention type (32%) and lack of awareness of ethical standards (27.2%) were associated with increased defensive behaviors. General surgery (29.8%) and orthopedics (17%) reported the highest conviction rates. The results showed that defensive medicine is prevalent among surgeons at IUMS due to legal fears and low self-confidence.

Enhancing targeted education and establishing clear ethical guidelines may reduce defensive practices and improve surgical care delivery.

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Introduction

Defensive medicine, characterized by medical practices driven primarily by fear of litigation rather than patient benefit, poses a significant challenge to healthcare systems worldwide, specifically in low resource settings (1). Such practices, including ordering unnecessary tests or avoiding high-risk procedures, escalate healthcare costs, increase physician stress, and may compromise the quality of care (2, 3). In high-risk specialties like surgery, defensive behaviors are particularly prevalent; global studies report rates as high as 93% in fields such as general surgery and orthopedics (4, 5). In the United States, defensive medicine contributes to estimated annual costs exceeding $45 billion, while in Europe, expenses reach €10–12 billion in countries like Italy (6, 7). Despite its global impact, the drivers and extent of defensive medicine in developing countries, including Iran, remain underexplored, necessitating targeted research to inform healthcare policy and education.

In Iran, rising medical malpractice complaints have strained physician–insurer relationships and intensified defensive practices, particularly within surgical disciplines (8). Studies in comparable settings, such as Turkey and China, suggest that legal pressures, heavy workloads, and low physician self-confidence fuel defensive behaviors (9, 10). Existing research often centers on Western contexts or general practitioners, leaving a critical gap in understanding defensive medicine among surgeons in developing nations, where judicial systems and medical training differ markedly (8, 11, 12). Although the issue of defensive medicine has been around for many years in developed countries, this phenomenon is not well known in developing countries, including Iran; however, the occurrence of behaviors such as referring patients to other specialists, documenting the patient's treatment process, and prescribing unnecessary medications indicate the prevalence of this factor among Iranian physicians (13). Many studies, especially in Iran, focus on the legal aspects and the burden on the healthcare system and patients, while the ethical aspect, which is an important part of the concept of defensive medicine, has received less attention. From an ethical perspective, defensive medicine occurs when the

physician does not make the best possible decision for the patient, but rather the decision that saves the physician from legal consequences. Defensive medicine has emerged and developed in the medical community in two forms: positive (reassuring) and negative (avoidant). The prevalence of positive defensive actions is higher than negative behaviors. Therefore, it is necessary to first examine the attitudes of specialized disciplines regarding the concept of defensive medicine and the reasons behind the practice. For this purpose, the present study explores the attitudes and practices of faculty members and residents in surgical disciplines at Iran University of Medical Sciences (IUMS) regarding defensive medical behavior. By exploring ethical perceptions, prevalent defensive practices, and their contributing factors, the study aims to provide clearer insights into this underexplored issue in Iran's surgical setting. The findings hold clinical and academic relevance by offering evidence to guide educational interventions, reduce unnecessary healthcare expenditures, and enhance surgical care quality. Specifically, we hypothesize that low self-confidence and legal fears significantly drive defensive practices among IUMS surgeons. The objectives are to determine the prevalence of defensive behaviors, assess their perceived ethicality, and identify key factors influencing their adoption, thereby informing strategies to mitigate their impact.

Methods

This cross-sectional study was conducted at university hospitals affiliated with Iran University of Medical Sciences (IUMS) in Tehran, Iran, from March to June 2023. The study population included all faculty members, specialized residents, and subspecialty fellows in surgical disciplines such as general surgery, orthopedics, obstetrics and gynecology, and other subspecialties. Inclusion criteria required active enrollment or employment at IUMS during the study period, and individuals unwilling to participate were excluded. After collecting data and entering it into SPSS 24 software, statistical analysis was performed. Chi-square test was used to compare categorical variables, and independent sample t-test and Mann Whitney U test were used to compare non-normal and normal variables, respectively. A significance level of less than 0.05% was considered in the analysis of the relationships.

Sampling

Participants were recruited using non-probability convenience sampling due to logistical challenges in accessing the entire eligible surgeon population. Sample size was calculated based on a prior study reporting a defensive medicine score (mean = 20.42, SD = 6.78) (14). Using G*Power version 3.1, a minimum sample size of 140 was determined to detect an effect size of 0.21 with 80% power and $\alpha = 0.05$. To account for potential non-response, 160 questionnaires were distributed, resulting in 147 completed responses (response rate 91.9%). It should be mentioned that this sampling approach, while practical, may introduce selection bias, which is addressed in the study limitations.

Data Collection

Data were collected using the validated Persian-language "Assessment of Defensive Medicine in Iran" questionnaire, developed for a doctoral dissertation at Tehran University of Medical Sciences (2). Its content validity ratio (CVR > 059) and content validity index (CVI > 0.78) as well as its reliability using Cronbach's alpha coefficient at 0.82 were determined (2). This questionnaire comprises 32 items distributed across four domains: demographics (10 items) covering age, sex, specialty, academic rank, years of professional experience, liability insurance status, and malpractice conviction history; attitudes (8 items) assessing perceptions of the ethicality of defensive medicine on a 5-point Likert scale (1 = never to 5 = always); practices (10 items) evaluating the frequency of defensive behaviors, such as ordering unnecessary laboratory tests and making consultation referrals, rated on a 5-point scale (1 = very low to 5 = high); and factors (4 items) identifying concerns driving defensive practices, including legal fears and workload, rated from "very important" to "not important".

The questionnaire was distributed in person by trained research assistants during surgical department meetings or clinical rounds, following a standardized protocol to ensure consistency. Participants completed questionnaires anonymously to minimize response bias. Responses were collected within one week of distribution. Ethics approval was obtained from the IUMS Ethics Committee (IR.IUMS.REC.1401.1014), and written informed consent was secured from all participants in adherence to the Helsinki Declaration principles.

Statistical Analysis

Data were analyzed using SPSS version 24. Categorical variables (e.g., sex and specialty) are presented as frequencies and percentages, while continuous variables (e.g., age and years of experience) are reported as means and standard deviations. Normality of continuous variables was assessed using the Shapiro-Wilk test. Normally distributed variables were compared using independent t-tests, and non-normal variables were analyzed using Mann-Whitney U tests. Associations between categorical variables (e.g., specialty and malpractice convictions) were evaluated using chi-square tests. To control for multiple comparisons, Bonferroni correction was applied as appropriate, maintaining a family-wise error rate of 0.05. Statistical significance was set at $P < 0.05$.

Results

Participant Demographics

Of the 147 participants, 97 were male (66.0%) and 50 female (34.0%), with a mean age of 38.1 years (SD = 10.05; range 27–73). The majority specialized in general surgery (70, 47.6%), followed by orthopedics (20.4%), and obstetrics and gynecology (11.6%). Academic ranks included 83 residents (56.5%), 51 faculty members (34.7%), and 18 subspecialty fellows (8.8%) (Table 1).

Table 1. Participant demographic and professional characteristics

Variable	Value
Sex, n (%)	
Male	97 (66.0)
Female	50 (34.0)
Age (years), mean ± SD (range)	38.1 ± 10.05 (27–73)
Specialty, n (%)	
General Surgery	70 (47.6)
Orthopedics	30 (20.4)
Obstetrics & Gynecology	17 (11.6)
Other (e.g., Pediatric Surgery, Oncology)	27 (20.4)
Academic Rank, n (%)	
Resident	83 (56.5)
Faculty	51 (34.7)
Fellow	18 (8.8)

Malpractice and Insurance Status

Liability insurance coverage was reported by 130 participants with 65 (48.1% of insured) having coverage for two full indemnity payments. Forty-seven participants (32.0%) reported prior malpractice convictions. Convictions were more frequent among males, but the difference was not statistically significant ($P = 0.45$). Significant

differences were found across specialties (P = 0.003), with general surgery (29.8%), obstetrics and gynecology (23.4%), and orthopedics (17.0%) reporting the highest rates. No convictions were reported in pediatric surgery, cardiac surgery, or surgical oncology. Participants with convictions were older than those without convictions (P = 0.001) (Table 2).

Table 2. Malpractice and insurance status

Variable	Value
Liability Insurance, n (%)	130 (88.4)
Indemnity Coverage (among insured), n (%)	
One full payment	53 (39.25)
Two full payments	65 (48.1)
Three full payments	14 (10.37)
Other levels	3 (2.22)
Malpractice Convictions, n (%)	47 (32.0)
Number of Convictions, mean ± SD (range)	3.12 ± 2.41 (0–12)
Convictions by Specialty, n (%)	
General Surgery	14 (29.8)
Obstetrics & Gynecology	11 (23.4)
Orthopedics	8 (17.0)
Other	14 (29.8)
Convictions by Sex, n (%)	
Male	29 (61.7)
Female	18 (38.3)

Attitudes Toward Defensive Medicine

Most participants viewed defensive practices as ethical, with 33 (22.4%) rating them ethical "always" and 39 (26.5%) "often" on a 5-point Likert scale. Similarly, 34 (23.1%) believed physicians have the right to act defensively "always," and 57 (38.7%) "often." Regarding specialty choice, 51 (34.7%) strongly disagreed that litigation fears influenced their decision, and 50 (34%) would not choose a less litigation-prone specialty if given the opportunity (Table 3).

Table 3. Attitudes toward ethicality of defensive medicine

Questionnaire Item	Always n (%)	Often n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)
Defensive practices are ethical	33 (22.4)	39 (26.5)	45 (30.6)	21 (14.3)	9 (6.1)
Physicians have the right to act defensively	34 (23.1)	57 (38.7)	50 (34)	0 (0)	6 (4.1)
Litigation fears influenced specialty choice	12 (8.2)	17 (11.6)	22 (15)	45 (30.6)	51 (34.7)
Would choose less litigation-prone specialty	19 (12.9)	12 (8.2)	13 (8.8)	53 (36.1)	50 (34)

Prevalence of Defensive Practices

The most frequent defensive practice was consultation referrals, reported as “high” by 47.6% and “moderate” by 31.3% of the participants. Avoiding high-risk procedures was common, with 44.3% rating it “high” and 29.3% “moderate.” Prolonged hospitalization was less common, with 31.3% reporting “moderate” and 29.3% “low” frequency (Table 4).

Table 4. Prevalence of defensive practices

Practice	High n (%)	Moderate n (%)	Low n (%)	Very Low n (%)
Consultation referrals	70 (47.6)	46 (31.3)	14 (9.5)	14 (9.5)
Avoiding high-risk procedures	65 (44.3)	43 (29.3)	23 (15.6)	11 (7.5)
Unnecessary laboratory tests	54 (36.7)	25 (17.0)	31 (21.1)	30 (20.4)
Avoiding high-risk patients	56 (38.1)	46 (31.3)	16 (10.9)	17 (11.6)
Exaggerating patient conditions	54 (36.7)	41 (27.9)	29 (19.7)	18 (12.2)
Unnecessary imaging	43 (29.3)	23 (15.6)	41 (27.9)	31 (21.1)
Prolonged hospitalization	33 (22.4)	46 (31.3)	43 (29.3)	19 (12.9)

Factors Driving Defensive Practices

The findings indicate that the primary concern among physicians regarding the increased likelihood of defensive medical practices is the perceived lack of expertise in rulings issued by adjudicating commissions, with 52 respondents (35.4%) rating it as "very important" and 48 (32.7%) as "important.”

Financial losses due to litigation costs and indemnity payments were deemed "very important" by 37 respondents (35.2%) and "important" by 65 (44.2%). Additionally, the considerable amount of stress associated with treatment of high-risk patients was deemed “very important.” The factors affecting defensive methods are arranged from highest to lowest importance in Table 5.

The indicators in Table 5 are a subset of professional conduct guidelines and ethical codes, and include the following: bad record in the professional file of doctors in the event of a patient complaint; inappropriate treatment by those handling the case; conviction and revocation of office license; lack of honesty and fairness in the case handling process; damage to professional reputation among patients and colleagues; and the possibility of patient aggression. These findings were positioned in a very important rank with a medium frequency. On the other hand, concerns about patient dissatisfaction due to non-compliance with

patient bills of rights and codes of ethics for the physician-patient relationship were not considered important.

These results indicate the low importance and lack of awareness of the target group regarding professional ethics codes as well as the inadequate training of the treatment team regarding the unethical nature of defensive medicine.

Table 5. Factors driving defensive practices

Factors	Very Important (%)	Important (%)	Moderately Important (%)	Slightly Important (%)	Not Important
Lack of expert rulings in verdicts issued by review commissions	35.4	32.7	29.3	2.7	0
Financial loss due to litigation expenses and compensation for damages	35.2	44.2	13.6	9.5	7.5
Severe stress during treatment of high-risk patients	34.7	42.2	19.7	2.7	0.7
Tarnishing of professional reputation among colleagues	29.9	38.8	17	6.8	7.5
Time limitations in liability insurance coverage (usually 4 years post-treatment)	29.3	32.7	32.7	4.1	1.4
Tarnishing of professional reputation among patients	29.3	40.8	18.4	5.4	6.1
Revocation (temporary or permanent) of the physician's license by investigating authorities	29.3	38.8	20.4	3.4	8.2
Review of complaints in hospital committees such as mortality committees	27.2	25.9	24.5	21.7	0.7
Inappropriate (demeaning or disrespectful) behavior by commission members	27.2	38.1	21.1	4.8	0.7
Likelihood of aggression or hostile behavior by patients or their relatives	21.1	46.3	26.5	5.4	0.7
Creation of a criminal record in the professional file of physicians following patient complaints	20.4	32.7	27.9	10.2	8.8
Psychological burden of appearing and responding in review commissions in front of colleagues	20.4	41.5	35.4	2.7	0
Wasted time and frequent referrals to judicial/disciplinary authorities	17.7	57.1	19.7	4.8	0.7
Perceived injustice or bias in the complaint process (e.g., conflict of interests, partiality, lack of independence)	14.3	29.9	38.1	11.6	0

Statistical Associations

No significant differences were found between genders in the prevalence of defensive practices (all $P > 0.05$, Mann–Whitney U tests). Residents reported higher frequencies of unnecessary laboratory tests (mean rank = 78.2) compared to faculty members (mean rank = 65.3; $U = 1765.5$, $P = 0.03$). General surgeons demonstrated higher rates of avoiding high-risk patients (mean rank = 82.1) compared to other specialties (mean rank = 68.4; $U = 1892.0$, $P = 0.01$). Age was positively correlated with conviction history ($r = 0.35$, $P = 0.001$, Pearson's correlation), but not with the

frequency of defensive practices (r = 0.12, P = 0.15).

Discussion

This study provides new insights into the prevalence of drivers of defensive medicine attitudes and the factors that prompt physicians to engage in positive and negative defensive medical actions among the surgeons at Iran University of Medical Sciences (IUMS). While 48.9% consider such practices to be ethically acceptable, these findings are in line with global trends, where defensive behaviors have been reported in 93% of high-risk specialties such as surgery (13 - 16). In a recent systematic review, Zheng et al. reported a 75.8% global prevalence of defensive medicine, with anesthesia (92.2%) and surgery (77.8%) being among the high-risk specialties (17). In Iran, Maleki et al. found that 54.5% of the physicians in Mashhad were familiar with defensive medicine, indicating a regional challenge that seems to be more prominent in surgical specialties (18). A notable point in this study is that positive defensive medicine with a prevalence of 47.6% (referral for consultation) and negative defensive medicine with a prevalence of 44.3% (avoidance of high-risk procedures for the patient) were accepted and practiced as ethical acts by 44.3% of the participants.

Therefore, the participants' attitude toward defensive medicine is a positive moral value, indicating an inappropriate doctor-patient relationship and a decrease in its quality, which is in contradiction with the Patient's Rights Charter and Code 25.26.27.28.29 of the General Guide to Professional Ethics for Medical Practitioners of the Medical System Organization. The reasons for practicing defensive medicine are mainly the unspecialized judicial rulings (35.4% with a rating of "very important") and the stress related to the management of high-risk patients (34.7% with a rating of "very important"). This pattern mirrors findings from Turkey, where 94.2% of surgeons reported defensive behaviors motivated by legal fears (14), and China, where 63% of physicians ordered unnecessary tests under litigation pressure (5). The national Code of Ethics for Medical Professionals in Iran, as detailed by Shamsi-Gooshki et al., emphasizes prioritizing patient welfare, avoiding unnecessary interventions, and adhering to evidence-based practice (19). However, defensive medicine, often driven by legal fears, conflicts with these principles by risking patient trust and

misallocating healthcare resources. Notably, general surgery and obstetrics at IUMS showed higher malpractice conviction rates (29.8% and 23.4%, respectively), which is consistent with U.S. data reporting up to 93% prevalence of defensive practices in high-risk specialties (20, 21). The significant association between older age suggests that more experienced surgeons face greater litigation exposure, potentially intensifying defensive behaviors. Conversely, residents' higher rates of unnecessary laboratory testing may indicate that lower self-confidence among trainees fuels positive defensive practices, corroborating prior research (22, 23).

Key drivers such as insufficient awareness of ethical standards and heavy workloads highlight systemic issues amenable to intervention. Forati and Mahdiyan recommended educational reforms to address defensive medicine in Iran, a strategy supported by our findings (24). Targeted training aimed at boosting surgeon confidence and clarifying ethical guidelines could mitigate unnecessary referrals and testing, aligning with recommendations from China, where workload reduction was associated with decreased defensive behaviors (25). These findings carry important implications: reducing defensive practices could improve surgical outcomes, lower healthcare costs in Iran amid rising litigation trends, and inform medical education by emphasizing ethics and resilience training.

Although the diverse surgical population at IUMS enhances representativeness of this study, there are certain limitations, including:

- Single-institution design and sampling method: The study was conducted exclusively among specialized and sub-specialized surgical residents at Iran University of Medical Sciences, and its findings may not be generalizable to other physician groups or healthcare settings. To obtain more precise and comprehensive results regarding attitudes toward defensive medicine across various medical specialties, future studies with a larger and more diverse population encompassing multiple disciplines are necessary. In addition, convenience sampling may skew results toward more accessible participants. Therefore, future research should consider multi-center designs to capture nationwide trends and incorporate objective measures—such as audit-based practice assessments—to validate self-reported behaviors. Furthermore, exploring cultural and judicial influences on defensive medicine in developing countries could enhance understanding and enable meaningful global comparisons.

- Self-reporting bias: Responses may have been influenced by social desirability bias, personal moral compass, adherence to professional ethics, and broader cultural and workplace social factors, potentially underestimating the prevalence of defensive practices and leading to biased outcomes.

- Limitations in assessing professional ethical codes, professional commitments, and cultural/social factors: This study examined factors such as work experience, malpractice insurance, and litigation concerns, which were based on the metrics of the questionnaire selected for this research. However, we recognized that other significant factors, such as the degree of professional commitment to adhering to ethical codes, as well as various cultural and social influences, likely play a crucial role in the manifestation of defensive medicine practices. The absence of metrics to evaluate these specific constructs within the employed instrument represents another limitation of this study.

Conclusion

The findings of this study demonstrate a high prevalence of defensive behaviors among surgeons at IUMS. These results highlight the urgent need for interventions such as confidence-building training, establishment of clear ethical guidelines, and judicial reforms. Such measures could reduce healthcare costs, improve care quality, and align the surgical practices in Iran with global evidence-based standards. Additionally, this study underscores the importance of future multi-center research to further understand defensive medicine and to inform policymaking across developing countries.

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Conflict of Interests

The author(s) declare no potential conflicts of interests with respect to the research, authorship, and/or publication of this article.

Ethics Approval

This study was approved by the IUMS Ethics Committee (IR.IUMS.REC.1401.1014), and informed consent was obtained from all participants.

Data Availability

No new data were created or analyzed beyond the questionnaire responses. Data are available upon reasonable request from the corresponding author.

Clinical Trial Number

Not applicable.

Author Contributions

Authors M.F and S.S and M.F and M.N each made significant contributions to the design, development this study, also M.F and M.F each made significant contributions to distribution, and collection of the questionnaire among the participants. Authors M.F and A.SH and E.SH and Y.Z made significant contributions to the data analysis and literature review. Authors M.F and A.SH and M.F wrote the text of the article. Authors M.F and M.N and M.F made significant contributions to the analysis of the tables. All authors read and approved the submitted version of the manuscript.

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