



Malpractice liability and defensive medicine in anesthesia: Egyptian anesthesiologists' perspectives

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ABSTRACT

Background: The threat of malpractice liability could alter anesthesiologists' clinical attitudes and behavior leading them to practice defensive medicine (DM) which aims at protecting doctors from medicolegal claims.

Purpose: To explore the knowledge, attitude, and practice of Egyptian anesthesiologists towards DM and their attitude and previous experience regarding medical malpractice liability.

Methods: An online cross-sectional questionnaire was done on a convenience sample of anesthesiologists. The questionnaire involved physician data, knowledge, attitude, and practice regarding DM, their attitude and previous experience regarding medical malpractice liability, and justifications for practicing DM.

Results: The questionnaire was completed by 177 anesthesiologists. Only 10.7% of participants received training about malpractice liability. The concern of malpractice litigation was reported by 81.4% and 92.1% of participants thought that malpractice lawsuits will have a negative influence on their performance. Most of the anesthesiologists (70.6%) reported that at least one of their colleagues was named in malpractice lawsuits, while 32.7% of them reported being investigated for malpractices. Based on "Defensive Medicine Behavior Scale", 61% of the participants had a very high score. The highest reported justification for DM was fatigue 27.7%.

Conclusions: Despite the fact that more than half of the participants' knowledge of DM was insufficient, about 61% had a very high score for DM-related behaviors. This highlights the DM current situation among them which could endanger physicians' proficiency, quality of care, patient rights, and cost. Efforts with medicolegal training should be made to keep physicians' risk perception and anxiety in balance to avoid DM.

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Medical malpractice; defensive medicine; intensive care; medical liability; Egyptian anesthesiologists

1. Introduction

Anesthesiology is a profession that deals with life and death situations on a regular basis. [1] The stressful workplace and the burnout during saving patients' lives result in mental and physical overload [2]. Numerous challenges are faced by physicians while dealing with medicolegal cases, and to overcome medical liability, they sometimes try avoiding involvement in such medicolegal and high-risk cases. [3] The fear of exposure to future medical litigation claims could lead them to practice Defensive Medicine (DM). [4] DM refers to medical behaviors that protect doctors from legal liability. [5] DM defines as "Defensive Medicine occurs when doctors order tests, procedures, or visits or avoid high risk patients or procedures, primarily (but not necessarily or solely) to reduce their exposure to malpractice liability. When physicians do extra tests or procedures primarily to

reduce malpractice liability, they are practicing positive DM (assurance behavior)" [6]. In contrast, avoidance behavior (negative DM) indicates obstructing the best possible treatment by either refusing to treat risky patients or resorting to patients' referral to other clinicians [7,8]. Furthermore, both DM and malpractice allegations have been known as one of the causes of increasing health-care costs [1,9]. DM practicing concerns have been growing internationally, and more recently in Egypt [10,11]. Most of the health-care professionals practice DM unintentionally without considering the legal consequences. [12] No previous study has investigated DM behaviors among Egyptian anesthesiologists. The present study aimed to evaluate the knowledge, attitude, and practice of a sample of Egyptian anesthesiologists regarding DM and their attitude and previous experience regarding medical malpractice liability.

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2. Methods

2.1. Ethical considerations

The study was approved by the Ethics Committee of the Faculty of Medicine, Suez Canal University, Egypt, with reference number (4794 #) and in accordance with the Helsinki Declaration. The completion of the questionnaire indicated the participants' agreement to participate in the study. A detailed study information was clarifying the purpose of the study, potential hazards and advantages, guaranteeing that participants have the right to withdraw or refuse participation without any negative consequences. An anonymous questionnaire was used to ensure data confidentiality.

2.2. Study design and Sample size

This study was a descriptive, cross-sectional study. The sample size was calculated using the following equation: [13]

$$n = \left[\frac{Z_{\alpha/2}}{E} \right]^2 * P(1 - P)$$

Where n = sample size $Z_{\alpha/2} = 1.96$ "The critical value that divides the central 95% of the Z distribution from the 5% in the tail" p = the prevalence of assurance practice among physicians = 89% [14].

E = the margin of error (=width of confidence interval) = 0.1, adding 10%, the sample size was 170 anesthesiologists.

2.3. Study tool

Data was collected through an electronic online self-administered semi-structured questionnaire.

The questionnaire consists of the following four sections including **Section 1**: physicians' information including age, sex, marital status, highest qualification, current job title, years of experience, previous training, some occupational data, and DM knowledge background. **Section 2**: Physicians' attitude and concerns regarding medical malpractice liability risk and previous exposure to medical malpractice suits and colleagues' experiences. **Section 3**: The Defensive Medicine Behavior Scale (DMBS). The DMBS was adopted to measure behavior as regards DM. The 14-item DMBS comprised nine positive and five negative DM statements. [15] The behavior-scoring employed a 5-point scale; 1–5 "1: completely disagree", to "5: completely agree". Each participant's total score was calculated as (minimum. 14; maximum. 70). To more accurately express the participants' responses to the items, the "completely agree, strongly agree, moderate agree" options were categorized as "yes," while the "disagree and completely disagree" responses were

categorized as "no" [5]. Additionally, The total scores were classified as very high (56–70 points), high (42–55 points), moderate (28–41 points), low level (14–27 points). [16] **Section 4**: Justifications for practicing DM were adopted from previous research (Burkle et al., 2012 and Mansour et al., 2020) [17,18]. The questionnaire was validated based on expert opinions. A pilot test of the questionnaire was performed on 20 participants to examine the appropriateness of the questions and their comprehension. The Cronbach's alpha test was utilized to measure the reliability of the tool.

2.4. Data collection

Participants' emails and contact information of physicians were obtained from the Egyptian Society of Anesthesiologists. From March to May 2022, a convenience sampling technique was used using an online survey that was distributed through an online link posted on various social networking platforms and emails. The questionnaire link was distributed to anesthesiologists through their institutional emails, WhatsApp and particular Facebook groups. The informed consent was gathered by clicking the agreement button on the information page.

2.5. Statistical analysis

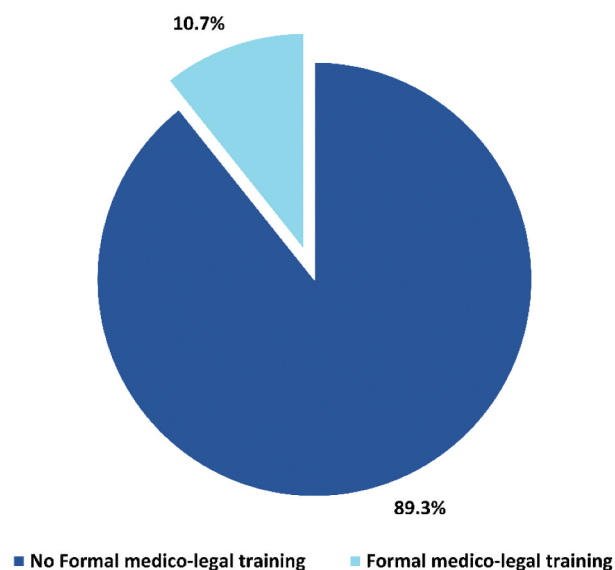
Data from the questionnaire was coded, entered, and analyzed using statistical package for social sciences (SPSS) software version 23. Data were presented as frequencies and percentages for categorical variables. Quantitative variables were presented as median and interquartile range (IQR) or mean and standard deviation. Chi-square test was used to test the significance of relations between categorical variables. Student's t-test and one-way ANOVA were used to test the significance of differences between parametric data, while Mann–Whitney and Kruskal–Wallis tests were used for non-parametric data. Spearman correlation was used to determine the correlation between numeric variables. P-value of <0.05 was considered statistically significant.

3. Results

The study included 177 anesthesiologists working in Egyptian hospitals. The participants' demographic and occupational data are shown in **Table 1**. Most of the participating anesthesiologists were either permanently employed 75 (42.4%) or both permanently employed in a place and working on a contract in another place 70 (39.5%). As presented in **Figure 1**, only 10.7% of the study participants had formal training about malpractice liability. **Figure 2** shows that only 10 (5.6%) considered their knowledge about DM was sufficient. The most common sources of knowledge

Table 1. Demographic and occupational characteristics of participants ($n = 177$).

| Demographic characteristics | (%) |
|--|----------------|
| Age (years) | |
| Mean \pm SD | 38.8 \pm 8.8 |
| Median (IQR) | 38 (10) |
| Age groups | |
| <30 | 20 (11.3%) |
| 30–<40 | 88 (49.7%) |
| 40–<50 | 48 (27.1%) |
| 50–60 | 17 (9.6%) |
| >60 | 4 (2.3%) |
| Sex | |
| Female | 61 (34.5%) |
| Male | 116 (65.5%) |
| Marital status | |
| Divorced | 3 (1.7%) |
| Married | 140 (79.1%) |
| Single | 33 (18.6%) |
| Widow | 1 (0.6%) |
| Occupational characteristics | |
| Current job title | |
| Resident | 23 (13%) |
| Specialist/assistant lecturer | 70 (39.5%) |
| Lecturer/consultant | 76 (42.9%) |
| Assistant professor/professor | 8 (4.5%) |
| Highest qualification | |
| Bachelor's degree of medicine and surgery | 21 (11.9%) |
| Diploma | 5 (2.8%) |
| Master of science | 56 (31.6%) |
| Egyptian fellowship | 20 (11.3%) |
| Medical doctorate | 75 (42.4%) |
| Workplace | |
| University hospital | 111 (62.7%) |
| Health insurance organization | 22 (12.4%) |
| Military hospital | 26 (14.7%) |
| Ministry of health hospital/health center | 49 (27.7%) |
| Private sector | 58 (32.8%) |
| Total time in the field of anesthesia (years) | |
| Mean \pm SD | 13.1 \pm 8.5 |
| Median (IQR) | 12 (9) |
| Number of cases examined per week (median, IQR) | 30 (35) |
| Type of employment | |
| Contract | 32 (18.1%) |
| Permanent | 75 (42.4%) |
| Both contract and permanent | 70 (39.5%) |

**Figure 1.** Formal training about malpractice liability taken by study participants ($n = 177$).

were senior staff and experience during practice was 53 (29.9% each) (more than one answer was accepted).

The most commonly reported attitude regarding malpractice liability was thoughts that malpractice claim will have an adverse effect on their performance 163 (92.1%), while the least one was "considering changing one's specialty due to malpractice anxiety" 98 (55.4%) (Table 2).

The concerns about medical malpractice's possible consequences as reported by study participants is mentioned in (Table 3).

The history of malpractice-related issues reported by the participating anesthesiologists is shown in Table 4. One hundred and twenty-five (70.6%) anesthesiologists reported that at least one of their colleagues was named in malpractice lawsuits, while 58 (32.7%) reported being investigated for malpractices during their professional life. One hundred and three (58.2%) anesthesiologists perceived the risk of malpractice lawsuit during residency as moderate-to-high risk. In addition, 74 (41.8%) of the participants reported that sometimes they regret being an anesthesiologist.

The Defensive Medicine Behavior Scale of the participating anesthesiologists is presented in Table 5. The most-reported assurance (positive) defensive medicine behavior was "Placing more emphasis on informed consent forms in order to protect oneself legally" being done by 177 (100%) of the anesthesiologists. The least reported behavior was "Prescribing as many drugs as one can in order to avoid legal problems" 73 (41.2%). Concerning avoidance (negative) defensive medicine behaviors, 163 (92.1%) of the anesthesiologists reported "Feeling uncomfortable in practice as malpractice is appearing more frequently in the media". The least reported negative behavior was "Avoiding patients with complex medical problems in order to avoid legal problems" 104 (58.8%). According to the DMBS scoring, 61% showed a very high score and only 1.1% showed low score (Figure 3).

The relation between different anesthesiologists' characteristics and DMBS is presented in Table 6. Positive DM showed statistically significant difference between anesthesiologists as regard their current job titles ($p = 0.026$) and their highest qualification ($p = 0.032$). The highest median score was recorded for Specialists/Assistant lecturers (median = 33, IQR = 7), while the least score was recorded for assistant professors/professors (median = 25, IQR = 13.3). Regarding its relation to highest qualification, positive DM score was highest among those who had Egyptian fellowship (median = 33.5, IQR = 5.8), while those having a diploma had the lowest score (median = 30, IQR = 7).

Concerning negative DM, it showed a significant difference between anesthesiologists regarding their job titles, where specialists/assistant lecturers had the highest score (median = 18, IQR = 6), and lowest score

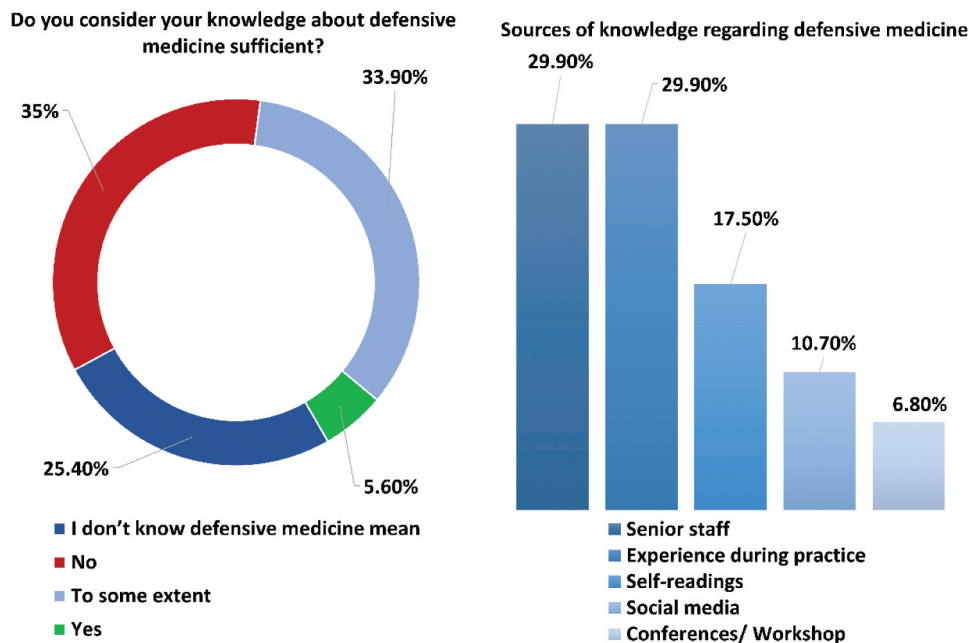


Figure 2. Background knowledge about defensive medicine.

was recorded for the assistant professors/professors' (median = 15, IQR = 8). Besides, anesthesiologists working in Ministry of health hospital/health centers showed significantly higher scores of negative defensive medicines when compared to those in other workplaces (mean \pm SD = 18.0 \pm 4.5) ($p = 0.019$). The overall DMBS score showed a significant difference among age groups. The highest score was among age group 30 to <40 years (median 51, IQR = 11) and the lowest was among those aged >60 years (median = 38, IQR = 19.5) ($p = 0.044$). A significant difference was also recorded between different job titles, where the highest score was among Specialists/Assistant lecturers (median = 51, IQR = 12) and the lowest score among Assistant professors/Professors (median = 40, IQR = 32) ($p = 0.037$). In addition, there was a significant difference between anesthesiologists' scores in relation to their highest qualifications, where those with Egyptian fellowship showed the highest score (median = 52.2, IQR = 9) and those with Medical Doctorate showed the lowest score (median = 47, IQR = 11) ($p = 0.015$).

4. Correlation between overall DMBS and fear of malpractice risk

There was a moderate direct correlation between DMBS and fear of malpractice risk (Spearman correlation coefficient = 0.299, p value <0.001).

Justifications for practicing defensive medicine as reported by the study participants are presented in Figure 4. The highest was fatigue (27.7%), and the lowest one was that patients had private health insurance (6.2%).

5. Discussion

Anesthesiology is categorized as a high-risk specialty liable to lawsuits, thus DM is projected to be increasingly widely used in such a specialty. [8] Only 10 (5.6%) of participants thought their DM knowledge was sufficient. How could we interpret such medical illiteracy as a harmless and legitimate act!. Additionally, one of the most common sources of such knowledge, as reported by 53 (29.9%) of participants, was the senior staff. This is an alarming sign as malpractice is frequently characterized as a divergence from the standard of care. The dilemma is as follows: who determines what constitutes optimum medical care? The legal definition of standard of care is just what other competent physicians would have done in identical situations. As a result, there is no objective reference point for the standard care. [8] Accordingly, physicians might feel driven to practice DM in accordance with what they perceive their colleagues are doing [7].

The majority of the participating anesthesiologists 146 (82.5%) believed that there has been an increase in malpractice lawsuits recently. This was rationalized by the enhanced awareness of patients' rights in the setting of a healthcare system overwhelmed with limited resources [10]. Eighty-nine percent of our participants thought the danger of lawsuits against anesthesiologists was higher compared with other specialties. This agrees with a study on medical lawsuits in Egypt which concluded that the number of lawsuits increases each year and that anesthesia as a specialty showed the largest share. [19]

Fifty-eight (32.7%) of participants reported that they had already been investigated for malpractices during their professional life. A lower percentage was shown

Table 2. Physicians' attitude regarding medical malpractice liability risk ($n = 177$).

| Items | Yes | No |
|---|-------------|------------|
| Recently, the number of malpractice lawsuits has increased. | 146 (82.5%) | 31 (17.5%) |
| (1) Concerns about malpractice when choosing a specialty | 106 (59.9%) | 71 (40.1%) |
| (2) Considering changing one's specialty or profession due to malpractice anxiety | 98 (55.4%) | 79 (44.6%) |
| (3) Prefer working in blame-free culture | 109 (61.6%) | 68 (38.4%) |
| (4) Professional liability insurance makes physician feel protected during medical practice | 150 (84.7%) | 27 (15.3%) |
| (5) Think that malpractice lawsuit will have a negative impact on performance | 163 (92.1%) | 14 (7.9%) |
| Fear of malpractice | 159 (89.9%) | 18 (10.1%) |

in some studies. [5,20] Half of participants believed that one could consider changing one's specialty or profession due to malpractice anxiety (55.4%). This agrees to some extent with Nahed et al. 2012 results where 71% of their participants confessed that the malpractice liability atmosphere affected their ability to continue in their specialty. [21] Moreover, due to malpractice concerns, half of the participants in another study were considering shifting their fields of specialty. [5]

Only 17.5% in our study declared that their workplaces offer insurance for physicians if there is any medical liability. This agrees with another study in Egypt [11], while disagrees with several studies in other settings. [20,22] Eighty-four percent of our participants believe that "Professional liability insurance makes one feel secure". On the other hand, another study revealed that DM was used more frequently by general practitioners with liability insurance [23]. In addition, even being covered with liability insurance did not increase security sensation in work as reported by Calikoglu and Aras [5].

According to the studied group, the malpractice lawsuits will have a negative impact on their medical performance. Furthermore, 81.4% were concerned with the malpractice litigation as a medical malpractice's possible consequences, and this is in accordance

with some studies. [5,10] Furthermore, in our study, we found a moderate direct correlation between DMBS and fear of malpractice risk. This agrees with other studies, including Catino's 2011 study where 86.8% of their surveyed anesthetists confessed to performing DM due to apprehension about malpractice lawsuits. [24] As malpractice lawsuits against physicians are now a strong likelihood rather than a far-fetched prospect, some of them began to feel compelled to take measures intended only to protect themselves in the event of a malpractice claim [25]. Additionally, there is a prevalent belief that courts focus on facts from objective investigations rather than assertions of expertise or clinical opinion [7]. The continuation of such a legally supported blame culture endorses practicing DM [24]. However, DM behaviors could sometimes contribute to more malpractice lawsuits [26]. If patients become aware of the widely used DM, this may reduce patients' confidence and appreciation toward physicians thus creating an atmosphere that may be conducive to more lawsuits and patient claims [27]. Moreover, DM may set new norms for considering the standard of care, thus practicing the previously

Table 4. Medical malpractice history reported by study participants.

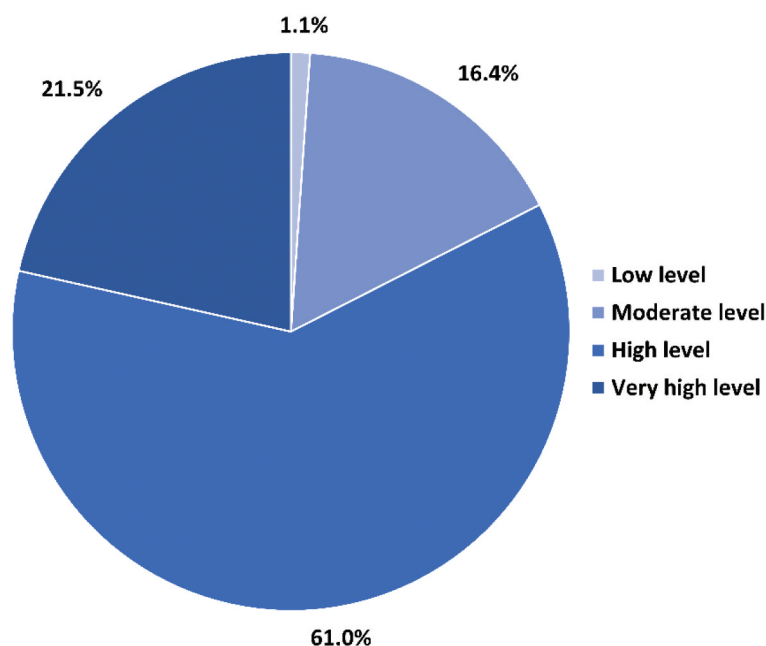
| Medical malpractice history | No. & (%) |
|---|-------------|
| Naming colleagues in malpractice suits | 125 (70.6%) |
| Have you ever been investigated for malpractice during your life of profession? | 58 (32.7%) |
| Number of claims against you in your experience | |
| <5 | 53 (29.9%) |
| ≥5 | 5 (2.8%) |
| Work offering insurance for physicians if there are any medical liability (medico-legal claims) | |
| Covered | 31 (17.5%) |
| Not covered | 90 (50.8%) |
| Don't know | 56 (31.6%) |
| Perceived risk of malpractice lawsuit during residency | |
| Low | 74 (41.8%) |
| Moderate/high | 103 (58.2%) |
| Litigations/lawsuits against anesthetists versus other medical specialties | |
| Higher risk | 158 (89.3%) |
| Lower risk | 3 (1.7%) |
| No difference | 9 (5.1%) |
| I have no opinion | 7 (4.0%) |
| Regret being an anesthesiologist | |
| Never | 45 (25.4%) |
| Rarely | 26 (14.7%) |
| Sometimes | 74 (41.8%) |
| Often | 13 (7.3%) |
| Always | 19 (10.7%) |

Table 3. Concerns about medical malpractice's possible consequences reported by study participants.

| Medical malpractice | Yes | No |
|--|-------------|------------|
| Blame from colleagues | 103 (58.2%) | 74 (41.8%) |
| Disciplinary action by a professional body | 114 (64.4%) | 63 (35.6%) |
| Financial impact | 135 (76.3%) | 42 (23.7%) |
| Loss of reputation among colleagues | 121 (68.4%) | 56 (31.6%) |
| Malpractice litigation | 144 (81.4%) | 33 (18.6%) |
| Negative patient or family reaction | 138 (78.0%) | 39 (22.0%) |
| Negative publicity from news media | 138 (78.0%) | 39 (22.0%) |

Table 5. Attitudes and behaviors of anesthesiologists about defensive medicine using the defensive medicine behavior scale (DMBS) ($n = 177$).

| Statements | | Yes | No |
|-----------------------------|---|-------------|-------------|
| Positive defensive medicine | I order extra tests for my patients for legal protection | 151 (85.3%) | 26 (14.7%) |
| | I hospitalize patients for reasons other than indications (e.g., social indication) in order to avoid legal problems | 107 (60.5%) | 70 (39.5%) |
| | I prescribe as many drugs as I can in order to avoid legal problems | 73 (41.2%) | 104 (58.8%) |
| | I spend more time with my patients in order to protect myself legally | 146 (82.5%) | 31 (17.5%) |
| | I explain medical procedures to my patients in more detail in order to protect myself legally | 175 (98.9%) | 2 (1.1%) |
| | I order more consultations on possible complications in order to avoid legal problems | 163 (92.1%) | 14 (7.9%) |
| | I use imaging techniques more often in order to avoid legal problems | 145 (81.9%) | 32 (18.1%) |
| | I keep more detailed records in order to avoid legal problems | 164 (92.7%) | 13 (7.3%) |
| | I place more emphasis on informed consent forms in order to protect myself legally | 177 (100%) | 0 (0.0%) |
| Negative defensive medicine | I prefer to use non-invasive protocols instead of interventional treatment protocols in order to avoid legal problems | 139 (78.5%) | 38 (21.5%) |
| | I avoid treatment protocols with high complication rates in order to avoid problems | 147 (83.1%) | 30 (16.9%) |
| | I avoid patients with complex medical problems in order to avoid legal problems | 104 (58.8%) | 73 (41.2%) |
| | I avoid patients who are likely to sue in order to avoid legal problems | 139 (78.5%) | 38 (21.5%) |
| | I feel uncomfortable in practice as malpractice is appearing more frequently in the media | 163 (92.1%) | 14 (7.9%) |

**Figure 3.** Defensive medicine behavior scale scores of the participating anesthesiologists ($n = 177$).

known evidenced standard of care might be a liability premise. [28]

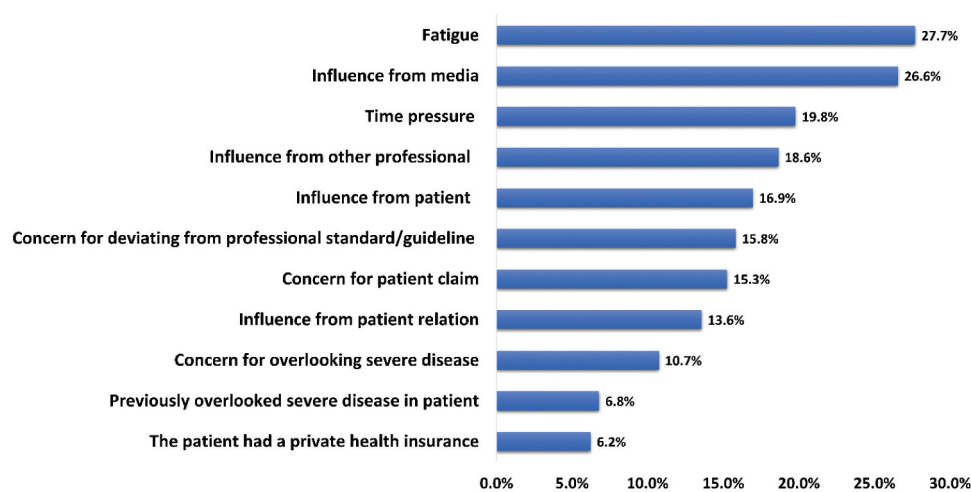
DM is a significant concern affecting the way physicians manage patients [27]. According to DMBS, 61% of our participants had a very high score for DM-related behaviors. In this study, the most reported assurance DM behavior was placing more emphasis on informed consent forms to protect themselves legally. Then came explaining medical procedures to patients, keeping more records, and ordering more

consultations on possible complications, to avoid future legal consequences. The most-reported avoidance DM behavior was "Feeling uncomfortable in practice as malpractice is appearing more frequently in the media". This was followed by avoiding treatment protocols with high complication rates to avoid problems. Our results agree to some extent with several studies in Egypt and other settings where different forms of both types of DM behaviors, but with different percentages, were revealed. [5,10,11,20,23,24,29] According to

Table 6. Comparison regarding defensive medicine behavior scale scores and anesthesiologists' demographic and occupational characteristics ($n = 177$).

| | Positive defensive medicine Median (IQR) | p Value | Negative defensive medicine | p Value | DMBS | p Value |
|--|--|----------------------------|-----------------------------|----------------------------|-------------|----------------------------|
| Demographic characteristics | | | | | | |
| Age groups (median, IQR) | | | | | | |
| <30 (20) | 32.0 (7.5) | 0.077 ^c | 16.0 (5.5) | 0.063 ^c | 50.0 (11.0) | 0.044^{c,e} |
| 30–<40 (88) | 33.0 (7.0) | | 18.0 (5.0) | | 51.0 (11.0) | |
| 40–<50 (48) | 31.0 (7.8) | | 16.0 (6.0) | | 47.5 (11.8) | |
| 50–60 (17) | 28.0 (11.5) | | 15.0 (6.5) | | 42.0 (14.5) | |
| >60 (4) | 25.5 (6.5) | | 12.5 (13.0) | | 38.0 (19.5) | |
| Sex | | | | | | |
| Female (61) | 32.0 ± 5.2 | 0.770 ^a | 16.6 ± 4.0 | 0.602 ^a | 48.6 ± 7.9 | 0.951 ^a |
| Male (116) | 31.8 ± 5.8 | | 16.9 ± 4.2 | | 48.7 ± 9.0 | |
| Marital status (median, IQR) | | | | | | |
| Divorced (3) | 27 (1) | 0.454 ^c | 14 (1) | 0.526 ^c | 40 (2) | 0.456 ^c |
| Married (140) | 32 (8) | | 16.5 (5) | | 49 (13) | |
| Single (33) | 32 (6) | | 17 (6) | | 50 (10) | |
| Widow (1) | 30 | | 12 | | 42 | |
| Occupational characteristics | | | | | | |
| Current job title (median, IQR) | | | | | | |
| Resident (23) | 31 (7.0) | 0.026^{c,e} | 16 (7) | 0.044^{c,e} | 49 (10) | 0.037^{c,e} |
| Specialist/assistant lecturer (70) | 33 (7.0) | | 18 (6) | | 51 (12) | |
| Lecturer/consultant (76) | 32 (11.0) | | 16 (5) | | 48 (12) | |
| Assistant professor/professor (8) | 25 (13.3) | | 15 (8) | | 40 (32) | |
| Highest qualification (median, IQR) | | | | | | |
| Bachelor degree of medicine (21) | 31.0 (7.0) | 0.032^{c,e} | 15.0 (5.5) | 0.094 ^c | 48.0 (10.0) | 0.015^{c,e} |
| Diploma (5) | 30.0 (7.0) | | 21.0 (8.5) | | 51.0 (15.5) | |
| Master of science (56) | 33.0 (7.0) | | 17.5 (4.8) | | 51.0 (11.0) | |
| Egyptian fellowship (20) | 33.5 (5.8) | | 19.5 (5.0) | | 52.5 (9.0) | |
| Medical doctorate (75) | 31.0 (9.0) | | 15.0 (6.0) | | 47.0 (11.0) | |
| Workplace (mean ± SD) | | | | | | |
| University hospital (111) | 31.7 ± 5.7 | 0.576 ^a | 16.5 ± 4.2 | 0.199 ^a | 48.2 ± 8.8 | 0.330 ^a |
| Health insurance organization (22) | 31.8 ± 5.5 | 1.000 ^d | 17.6 ± 3.8 | 0.313 ^d | 49.4 ± 8.5 | 0.674 ^d |
| Military hospital (26) | 32.3 ± 5.5 | 0.628 ^d | 16.3 ± 4.2 | 0.727 ^d | 48.6 ± 8.5 | 0.899 ^d |
| Ministry of health hospital/health center (49) | 32.3 ± 5.5 | 0.461 ^a | 18.0 ± 4.5 | 0.019^{a,e} | 50.3 ± 9.0 | 0.111 ^a |
| Private sector (58) | 32.2 ± 6.1 | 0.512 ^a | 17.0 ± 4.7 | 0.675 ^a | 49.3 ± 10.1 | 0.568 ^a |
| Type of employment (mean ± SD) | | | | | | |
| Contract (32) | 31.5 ± 5.2 | 0.893 ^b | 16.9 ± 4.0 | 0.867 ^b | 48.4 ± 8.5 | 0.970 ^b |
| Permanent (75) | 32.0 ± 5.8 | | 16.6 ± 4.0 | | 48.7 ± 8.6 | |
| Both contract and permanent (70) | 31.8 ± 5.5 | | 17.0 ± 4.4 | | 48.8 ± 8.8 | |

IQR: interquartile range. ^aStudent t -test used. ^bOne-way ANOVA used. ^cKruskal–Wallis test used. ^dMann–Whitney test used. ^eStatistically significant at p value <0.05.

**Figure 4.** Justifications for practicing defensive medicine as reported by study participants ($n = 177$).

Rankema et al. 2019 study, anesthesiologists have placed a larger emphasis on risk prevention behavior during their practice. [14]

Overall, negative, and positive scores showed a statistically significant difference between anesthesiologists as regards their current job titles and age where the

lowest score was recorded for the assistant professors/professors' category. This could be due to the greater insight of them based on their higher knowledge level of the ethical concerns against DM. Moreover, they are considered to have higher professional competence, and lifelong experience [5,27]. Furthermore, physicians with less experience are more likely to perform avoidance DM behaviors. [22]

Only 10.7% of the study participants had formal training on malpractice liability. Conferences, workshops and courses conferred only 6.8% of their sources of knowledge. This highlights the need for special training and orientation on medicolegal issues as declared by Kamel et al. [19] Additionally, the medical schools should consider integrating the DM concept into their curricula. [7,27]

Among the study participants' justifications for DM practice, fatigue was the highest reported justification (27.7%). Other justifications were reported in varying percentages as media influence, time pressure, influence from other professionals, influence from patients, concern for deviating from professional standards/guidelines, and fear of patient claims. These reasons agree with the participating anesthesiologists' perception of the need for working in blame-free culture as stated by 61.6%. Fostering a sense of security necessitates the construction of an honest non-punitive atmosphere in which individuals may report unfavorable incidents and hazardous events without fear of retaliation. [24] The justifications presented in this study agree with the idea that DM has lately been expanded beyond patient or family member lawsuits to the sensation of being viewed among peers as a physician of reduced capabilities. Such reputational damage could lead to "burnout". This can be complicated even more by a blame culture stigmatizing physicians through the media. [8] Fatigue which was the most reported justification for practicing DM by our participants could also be explained by the fact that patients are becoming more aware of medical concerns and are less inclined to accept what is being offered to them, posing new challenges for physicians. [7] The reasons behind practicing DM differ from one study to another [11,12,23]. This may be due to differences in the legal system or the individual-based perception of DM.

Such concerns should be addressed thoroughly as physicians may believe they have no alternative except to behave defensively [27]. Some consider that a major legal and cultural reform is substantial [24]. Moreover, DM could be considered not only a healthcare system problem but also a practice issue. Even if a physician is motivated to practice defensively due to healthcare system issues and constraints, the physician must ultimately decide whether or not to participate in such defensive behavior [27]. If this issue is not addressed properly, the healthcare system will suffer. It is necessary to take substantial steps to defeat DM practice [5].

6. Strengths and Limitations

To the best of our knowledge, this is the first work about malpractice and defensive medicine among Egyptian anesthesiologists. The current study results could provide fundamentals for further analysis of the economic burden of defensive medicine. Limitations of this study included various aspects, first, the study tool was a self-administered questionnaire which can be susceptible to recall bias and social desirability bias. Second, the convenience sample could lead to selection bias and voluntary response bias. Moreover, generalizability could be hindered.

7. Conclusion

Despite the fact that more than half of the participants' knowledge of DM was insufficient, about 61% had a very high score for defensive medicine-related behaviors. Overall DMBS, negative DMBS, and positive DMBS scores showed a statistically significant difference between anesthesiologists as regards their current job titles where specialists/assistant lecturers had the highest score, and the lowest score was recorded for the assistant professors/professors' category. These data confirm the existence of a current problem regarding the practice of DM among Egyptian anesthesiologists. Accordingly, a prioritized set of goals in which the patient's best interests are the sole consideration throughout medical practice should be developed to serve as a stepping stone for a steady decrease in DM practice.

Abbreviations

DM: defensive medicine, DMBS: The Defensive Medicine Behavior Scale

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