Araştırma Makalesi
Research Article

Defensive Medicine in General Surgery: a Questionnaire Study in Turkey

GENEL CERRAHİDE DEFANSİF TIP: TÜRKİYE'DE BİR ANKET ÇALIŞMASI

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ABSTRACT

This study investigated the effects of defensive medicine on the practice of physicians in general surgery

Methods: A questionnaire consisting of 30 questions titled "Defensive Medicine in General Surgery" was administered to 229 physicians in general surgery by e-mail. The responses were evaluated by univariate and multivariate analyses.

Results: All variables with a statistically significant effect on defensive medicine during univariate analysis were included as candidate factors in multivariate linear regression analysis of defensive medicine. The tendency to adopt defensive medicine practices decreased significantly with an increasing total number of operations performed annually. With increasing degree of regret about working as a general surgeon and increasing scores concerning predictive attitude knowledge-based factors, the tendency to adopt defensive medicine practices also increased significantly. There were no significant correlations between other demographic characteristics and the tendency to adopt defensive medicine practices.

Conclusion: Detailed studies on determinant factors identified in this study may aid in resolving problems concerning defensive medicine.

Keywords: defensive medicine, general surgery, Turkey

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ÖZ

Amaç: Bu çalışmada, genel cerrahide defansif tıbbın hekimlerin uygulamalarına etkileri araştırılmıştır.

Gereç ve Yöntem: Genel Cerrahide 229 hekime e-posta yoluyla "Genel Cerrahide Defansif Tıp" başlıklı 30 sorudan oluşan bir anket uygulandı. Yanıtlar tek değişkenli ve çok değişkenli analizlerle değerlendirildi.

Bulgular: Tek değişkenli analiz sırasında defansif tıp üzerinde istatistiksel olarak anlamlı etkisi olan tüm değişkenler, defansif tıbbın çok değişkenli lineer regresyon analizine aday faktörler olarak dahil edildi. Yılda yapılan toplam ameliyat sayısının artmasıyla defansif tıp uygulamalarını benimseme eğilimi önemli ölçüde azalmıştır. Genel cerrah olarak çalışmaktan duyulan pişmanlık derecesinin artması ve öngörücü tutum bilgi temelli faktörlere ilişkin puanların artmasıyla birlikte defansif tıp uygulamalarını benimseme eğilimi de önemli ölçüde artmıştır. Diğer demografik özellikler ile defansif tıp uygulamalarını benimseme eğilimi arasında anlamlı bir ilişki bulunmadı.

Sonuç: Bu çalışmada belirlenen belirleyici faktörlere ilişkin detaylı çalışmalar, defansif tıbba ilişkin sorunların çözümüne yardımcı olabilir.

Anahtar Kelimeler: defansif tıp, genel cerrahi, Türkiye

Defensive medicine is defined as the requirement for additional tests, medical procedures, and consultations to avoid malpractice liability, as well as the avoidance of high-risk patients or medical procedures (1). Physicians are increasingly applying non-evidence-based defensive medicine practices to avoid lawsuits. This causes a considerable burden on the healthcare system (2). Malpractice pressure has affected the business practices of physicians worldwide, including the prioritization of medical procedures. These changes directly affect patient access to health services, as well as the costs incurred by individuals or health insurance companies. Although the provision of healthcare services is an important consideration for governments worldwide, changes in healthcare systems do not prioritize the concept of malpractice from the physician's perspective.

There is increasing evidence concerning defensive medicine practices and the burdens that ensue, financial and otherwise. The annual cost of defensive medicine in the United States is estimated to reach 50 billion USD (2, 3). Notably, the prevalence of defensive medicine in the United States can reach up to 93% in some specialties, including emergency medicine, general surgery, neurosurgery, obstetrics/gynecology, orthopedic surgery, and radiology (5). These specialties are the areas where acute medical problems, chronic diseases, and long-term procedural outcomes require rapid and aggressive decision-making during follow-up. Wrong decisions are inevitable and the physician's experience can affect the results. In all of these areas, especially general surgery, physicians who evaluate trauma or emergency situations experience an increased risk of malpractice related to routine practices and outpatient clinic conditions (4).

There have been few studies concerning defensive medicine in Turkey and there are minimal data relating to the extent of defensive medicine in general surgery (2,5,6,8-11). To evaluate tendencies toward defensive medicine among physicians working in general surgery in Turkey, this study evaluated the prevalence and characteristics by using a questionnaire approach.

MATERIAL AND METHODS

In this study, questionnaires consisting of questions administered to physicians in different countries (12,13) were modified to match the field of general surgery in Turkey, yielding a questionnaire consisting of 30 questions. This survey investigated the demographics of physicians

working in general surgery and sought responses to questions about defensive medicine practices.

The questionnaire was sent to 300 general surgeons with valid e-mail addresses. The survey was presented to participants using an online survey tool, and its purpose was explained to the participants before they began the survey. In total, 229 respondents completed the survey. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee, as well as the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. This study was approved by the Tepecik Training and Research Hospital Ethics Committee.

Statistical analysis

Data analysis was performed using IBM SPSS Statistics 17.0 (IBM Corporation, Armonk, NY, USA). The Kolmogorov–Smirnov test was used to examine whether continuous numerical variables exhibited normal distributions. The Levene test was used to determine whether the data exhibited homogeneity of variances. Descriptive statistics were generated, such that categorical variables were expressed as the number (%) of patients, while continuous numerical variables were expressed as means ± standard deviations.

Total raw scores were obtained from scores given by respondents to questions about predictive attitude, knowledge-based factors, and defensive medicine approach. Raw scores were converted to 100 points using the function ((raw score – lowest possible score) / (highest possible score – lowest possible score) 100). Thus, both predictive attitude knowledge-based factors and defensive medicine approach scores were transformed to scales of 0–100. A defensive medicine approach score of 0 indicated that the respondent was not inclined toward defensive medicine at all, while a score of 100 indicated that the respondent was strongly inclined toward defensive medicine. Differences between more than two independent groups were evaluated with one-way analysis of variance. Significant between-group differences were assessed using a post hoc Tukey's honest significant difference test. Significant correlations between continuous or categorical variables and defensive medicine approach levels were examined with Spearman's rank correlation test. Factors that most strongly predicted changes in defensive medicine approach levels were investigated by multivariate linear regression analysis. All variables with a statistically significant effect on defensive medicine during univariate analysis were included as candidate factors in multivariate linear regression analysis. Regression coefficients, 95% confidence intervals and t statistics were calculated for each variable. Results with $p < 0.05$ were considered statistically significant.

RESULTS

Tables 1 and 2 show the respondents' demographic characteristics.

Table 1. Demographic characteristics of participants
* Knowledge-based factors

	n=229
Age (year)	47.5±9.3
Age range (year)	30-70
Gender	
Male	212 (92.6%)
Female	17 (7.4%)
The institution	
State Hospital Step 2	64 (27.9%)
State Hospital Step 3	79 (34.5%)
University hospital	26 (11.4%)
Foundation-private university hospital	10 (4.4%)
Private hospital	46 (20.1%)
Private office	4 (1.7%)
Title	
Specialist doctor	151 (65.9%)
Minor specialist	12 (5.3%)
Başasistan	4 (1.7%)
Assistant Professor	9 (4.0%)
Associate Professor	34 (14.8%)
Professor	19 (8.3%)
Working time as a general surgery specialist	
1-5 years	24 (10.5%)

6-10 years	51 (22.3%)
11-15 years	32 (13.9%)
16-20 years	39 (17.0%)
21-25 years	40 (17.5%)
More than 25 years	43 (18.8%)
Predictive attitude *	73.2±16.9
Predictive attitude score range	28.1-100.0
Defensive medicine approach	44.8±21.9
Defensive medicine approach points range	0.0-100.0

* Knowledge-based factors

Table 2. Other demographic characteristics of participants

	n=229
Special interests	
Hepatobilier surgery	47 (20.5%)
Breast/ endocrine surgery	68 (29.7%)
Oncology	59 (25.8%)
Transplantation surgery	29 (12.7%)
Gastroenterology surgery	75 (32.8%)
Trauma surgery	13 (5.7%)
Colorectal surgery	79 (34.5%)
General surgery all branches	101 (44.1%)
How long has he been on a malpractice policy?	
1-4 years	13 (5.7%)
5-8 years	113 (49.3%)
9-12 years	74 (32.3%)
13 years and above	29 (12.7%)
Total number of surgeries per year	
0-100	51 (22.3%)
101-150	55 (24.0%)
151-200	42 (18.3%)
201-250	28 (12.3%)
>250	53 (23.1%)
The lawsuit against malpractice	
No	143 (62.4%)
Yes	86 (37.6%)
Administrative investigation	
No	84 (36.7%)
1 time	77 (33.6%)
2 times	43 (18.8%)
3 times	25 (10.9%)
Having to pay compensation	
No	214 (93.4%)
Yes	15 (6.6%)
Regret being a general surgeon	
Never	51 (22.3%)
Rarely	34 (14.8%)
Sometimes	84 (36.7%)
Often	42 (18.3%)
Definitely	18 (7.9%)

Eight Likert-type questions (scored between 1 and 5) were asked concerning predictive attitude knowledge-based factors. Total raw scores between 8 and 40 were converted into a 100 point system, using the formula described in the Methods section. Similarly, 10 Likert-type questions were asked concerning tendencies toward defensive medicine practices. Total raw scores between 10 and 50 were converted into a 100 point system, as above.

Table 3 shows the correlations between the respondents' demographic characteristics and their defensive medicine approach levels.

Table 3. Correlation coefficients and keyness levels between participants' various demographic characteristics and defensive medicine approach scores

	Correlation coefficient	P-value †
Age	-0.051	0.444
Working time as a general surgery specialist	-0.002	0.980
Malpractice policy processing time	0.013	0.851
Total number of surgeries per year	-0.274	**<0.001**
Administrative investigation into	0.007	0.912
Regret being a general surgeon	0.493	**<0.001**
Predictive attitude *	0.683	**<0.001**

* Knowledge-based factors, † Spearman's sequence numbers correlation test.

The tendency to adopt defensive medicine practices decreased significantly with an increasing total number of operations performed annually ($r = -0.274$ and $p < 0.001$). With increasing degree of regret about working as a general surgeon, the tendency to adopt defensive medicine practices also increased significantly ($r = 0.493$ and $p < 0.001$). With increasing scores concerning predictive attitude knowledge-based factors, the tendency to adopt defensive medicine practices increased significantly ($r = 0.683$ and $p < 0.001$). There were no significant correlations between other demographic characteristics and the tendency to adopt defensive medicine practices ($p > 0.05$).

Table 4 shows comparisons of defensive medicine approach levels according to the respondents' demographic characteristics.

Table 4. Defensive medical approach levels according to various demographic characteristics of the participants

	N	Defensive medicine approach	p-value
Gender			0.333†
Male	212	45.2±22.0	
Female	17	39.8±19.7	
The institution in which he works			**0.010˘**
State Hospital Step 2	64	51.6±20.8[a]	
State Hospital Step 3	79	43.4±21.3	
University hospital	36	37.1±20.7[a]	
Private hospital – practice	50	43.8±23.0	
Title			**0.028˘**
Expert-Başasistan-Assit.Prof.	164	47.2±20.9[b]	
Minor specialist	12	39.8±19.3	
Professor- Associate Professor	53	38.4±24.1[b]	
Working time as a general surgery specialist			0.705˘
1-5 years	24	50.0±14.9	
6-10 years	51	42.2±21.1	
11-15 years	32	41.8±24.7	
16-20 years	39	46.4±28.4	
21-25 years	40	44.7±20.1	
More than 25 years	43	45.9±18.8	
How long has he been on a malpractice policy?			0.720˘
1-4 years	13	41.1±16.3	
5-8 years	113	45.7±21.8	
9-12 years	74	43.1±23.3	
13 years and above	29	47.3±21.2	
Total number of surgeries per year			**0.002˘**
0-100	51	53.3±20.8[c]	
101-150	55	47.3±23.1	
151-200	42	44.0±24.6	
201-250	28	41.8±16.0	
>250	53	36.3±8.9[c]	

† Student's t test, ≤ One-Way varience analysis (One-Way ANOVA), a: The difference between the group working in State Hospital Step 2 and the group working in university hospitals is statistically significant (p=0.007), b: Expert, The difference between the group working as a member of the Başasistan or Assistant Prof. and the group working as professors or associate professors is statistically significant (p=0.029), c: The difference between the group that performed 0-100 surgeries per year and the group that performed more than 250 surgeries is statistically significant (p<0.001).

There was a significant change in defensive medicine approach level according to the institution in which respondents worked (p = 0.010), such that surgeons working in public secondary hospitals had a greater tendency to adopt defensive medicine practices than did surgeons working in university hospitals (p = 0.007). There was a significant change in defensive medicine approach level according to the respondents' titles (p = 0.028), such that surgeons working as specialists, chief residents, or doctor lecturers had a greater tendency to adopt defensive medicine practices than did surgeons working as professors or associate professors (p = 0.029). There was no significant change in defensive medicine approach level according to the duration of employment as a general surgeon (p = 0.705). There was no significant change in defensive medicine approach level according to the duration of malpractice policy (p = 0.720). There was a

significant change in defensive medicine approach level according to the total number of operations performed annually (p = 0.002), such that general surgeons who performed 0–100 operations per year had a greater tendency to adopt defensive medicine practices than did general surgeons who performed > 250 operations per year (p < 0.001).

Table 5 shows comparisons of defensive medicine approach levels according to the respondents' professional interests.

Table 5. Comparisons in terms of defensive medicine approach scores based on participants' interests

	N	Defensive medicine approach	P-value †
Hepatobilier			0.285
He's not interested.	182	45.6±21.8	
He's interested.	47	41.7±22.1	
Breast endocrine			0.271
He's not interested.	161	45.8±22.2	
He's interested.	68	42.3±21.0	
Oncology			**0.015**
He's not interested.	170	46.9±21.7	
He's interested.	59	38.9±21.4	
Transplantation			0.175
He's not interested.	200	45.5±21.1	
He's interested.	29	39.6±26.4	
Gastroenterological surgery			0.469
He's not interested.	154	45.5±22.1	
He's interested.	75	43.3±21.3	
Trauma warfare surgery			0.181
He's not interested.	216	44.3±21.4	
He's interested.	13	52.7±28.1	
Colorectal surgery			0.944
He's not interested.	150	44.7±22.9	
He's interested.	79	44.9±19.9	
General surgery all branches			0.317
He's not interested.	128	43.5±22.1	
He's interested.	101	46.4±21.5	

† Student's t test.

There was no significant difference in defensive medicine approach levels according to the respondents' professional interests, except for oncology (p > 0.05 for all others). The defensive medicine approach levels of surgeons interested in oncology were significantly lower than those of general surgeons who were not interested in oncology (p = 0.015).

Table 6 shows comparisons of defensive medicine approach levels according to the respondents' other demographic characteristics.

Table 6. Levels of defensive medicine approach according to other demographic characteristics of participants

	N	Defensive medicine approach	p-value
The lawsuit case against malpractice			0.412†
No	143	43.9±20.8	
Have	86	46.3±23.5	
Administrative investigation into			0.346˘
No	84	45.6±22.0	
1 time	77	43.2±22.1	
2 times	43	42.2±21.6	
3 times	25	51.3±20.9	
Having to pay compensation			0.559†
No	214	44.6±21.7	
Yes	15	48.0±24.1	
Regret being a general surgeon			**<0.001≤**
Never	51	32.3±19.4[a,b,c]	
Rarely	34	32.4±16.5[d,e,f]	
Sometimes	84	46.8±19.1[a,d,g]	
Often	42	56.5±18.4[b,e]	
Definitely	18	66.7±23.2[c,f,g]	

† Student's t test, √ One-Way varience analysis (One-Way ANOVA), a: The difference between a group that never regrets and sometimes a regretful group is statistically significant (p<0.001), b: A group that regrets often with a group that never regrets the difference between statistically significant (p<0.001), c: The difference between the group that never regrets and the group that certainly regrets it is statistically significant (p<0.001), d: Rarely regretted group the difference between the group that sometimes regrets is statistically significant (p=0.002), e: The difference between the group that rarely regrets and the group that often regrets is statistically significant (p<0.001), f: The difference between the group that rarely regrets and the group that regrets it is statistically significant (p<0.001), g: The difference between the group that sometimes regrets and the group that regrets it is statistically significant (p<0.001).

There were no significant changes in defensive medicine approach levels according to whether respondents had experienced lawsuits for malpractice, the number of investigations respondents had experienced, or whether they were required to pay compensation ($p = 0.412$, $p = 0.346$, and $p = 0.559$, respectively). There was a significant change in defensive medicine approach level according to whether respondents regretted the choice of a career in general surgery ($p < 0.001$). Notably, general surgeons who sometimes, often, or always regretted this career choice had a greater tendency to adopt defensive medicine practices than did respondents who never or rarely regretted their choice ($p < 0.01$). In addition, general surgeons who often or always regretted this career choice had a greater tendency to adopt defensive medicine practices than did respondents who sometimes regretted their choice ($p < 0.001$).

Table 7 shows the results of multivariate linear regression analysis to identify the factors with greatest ability to predict changes in defensive medicine approach levels.

Table 7. Factors that are most decisive in predicting the change in defensive medicine approach levels as a result of multivariational linear regression analysis

	Regression coefficient	95% Confidence Interval		t statistics	p-value
		Lower limit	*Upper limit*		
State Hospital Step 2	9.891	3.036	16.746	2.844	**0.005**
State Hospital Step 3	4.670	-1.631	10.971	1.461	0.146
Private hospital – practice	10.111	3.118	17.105	2.849	**0.005**
Minor specialist	-1.246	-10.648	8.155	-0.261	0.794
Professor- Associate Professor	0.872	-4.558	6.303	0.317	0.752
Interest in oncology	-4.160	-8.951	0.631	-1.711	0.088
Total number of surgeries per year	-1.011	-2.433	0.411	-1.401	0.162
Predictive attitude *	0.698	0.565	0.830	10.393	**<0.001**
Regret being a general surgeon	4.378	2.486	6.270	4.560	**<0.001**

* Knowledge-based factors.

The factors most able to predict changes in defensive medicine approach were predictive attitude, regret concerning work in general surgery, and the type of institution in which the respondents worked.

Regardless of other factors, each 10-point increase in predictive attitude knowledge-based factors caused a significant 6.98-point increase (95% confidence interval: 5.65–8.30) in defensive medicine approach level ($p < 0.001$). When adjusted for other factors, each 1-step increase in the degree of regret for selection of a general surgery career also caused a significant 4.38-point increase (95% confidence interval: 2.49–6.27) in defensive medicine approach level ($p < 0.001$). When controlling for other factors, working in a public secondary hospital increased the defensive medicine approach level (95% confidence interval: 3.04-16.75), compared with working in a university hospital ($p = 0.005$). Moreover, working in a private hospital or private clinic increased the defensive medicine approach level by 10.11 points (95% confidence interval: 3.12–17.10) ($p = 0.005$).

Discussion

To the best of our knowledge, this is the first study to investigate the application of defensive medicine and its effects on healthcare provision among physicians in general surgery. Previous studies in Turkey have been limited and have been less specific (14,15). In this study, the field of general surgery was considered because it is a high-risk specialty in which defensive medicine is practiced by 60% of physicians in Israel (12), 46% in Australia (17), 75% in England (16), and 93% (5) in the United States. These rates are averages determined in general medical practice, rather than through a specific survey of general surgeons. In the current study, predictive approaches to the practice of defensive medicine on the part of physicians working in general surgery in Turkey and defensive medicine approaches directly evaluated over 100 points and was found 73.2 ± 16.9 and 44.8 ± 21.9, respectively. In our study, as part of a defensive medicine approach, 36.2% of respondents indicated that they "frequently" or "absolutely" requested observational hospitalization, 42.8% indicated that they requested additional tests or interventional procedures, 17.4% ordered more medication, and 25.4% requested additional consultation. This kind of remarkable approach is unnecessary and poses additional burdens for both the patient and healthcare provider. Furthermore, only 23.6% of invasive interventions, which pose a significant or inevitable risk in terms of ethics and patient health, were never applied by respondents, and were considered to carry a very high risk level of 76.4%.

Notably, physicians' use of a defensive medicine approach can be predicted. A high predictive attitude

score, calculated as 73.2 ± 16.9 in this study, can be interpreted as a physician's view that a patient poses a potential threat to medical practice. Some respondents (74.2%) reduced or stopped high-risk procedures to avoid lawsuits, and the rate at which some surgical interventions were avoided was 79.9%. This defensive medicine approach, which causes physicians to avoid the basic tasks of their profession, carries serious negative implications.

In total, 62.4% of the respondents in this study had been sued, 63.3% had been subjected to an administrative investigation, and 6.6% had been required to pay compensation. The most prominent factor influencing the defensive medicine practices of the respondents in this study was that of the number of patients. In addition, predictive attitude and regret concerning career choice were important influencing factors. The pressures on physicians to perform defensive medicine, in terms of the increasing number of patients and various secondary factors (e.g., fatigue, burnout, and performance anxiety), is generally an expected result. Notably, these pressures were confirmed in our study. The respondents' institutions and titles were also important influencing factors. There was a considerable difference between crowded clinics with more shared responsibilities and smaller clinics in which physicians worked alone. Physicians feel less secure when they are evaluated only in terms of their personal competence. Physicians' past experiences regarding their responsibilities affect clinical decision-making and their tendencies to act defensively (5,18,19). Our study findings support the previous result in which 75% of physicians in low-risk specialties involving patients ≤ 65 years of age, as well as 99% of physicians in high-risk specialties, had experienced malpractice claims in the United States (20).

Defensive behaviors can reduce access to care and even cause physical damage. Most respondents in our study (77.7%) reported some degree of regret concerning the selection of a general surgery career. This characteristic is one of the strongest predictive factors for defensive medicine (Table 7). In recent years, the reduction in entrance base scores in the specialty exam has emerged as a factor that should be evaluated in terms of professional status and future.

Transition studies do not suggest a reduction in defensive medicine practices. The causes and effects of defensive medicine should be identified. Notably, each country and specialty has unique dynamics. To make recommendations, factors influencing the causes of defensive medicine and other considerations must be revealed. Malpractice laws or regulations alone will fail to provide adequate solutions (21).

This study had similar limitations to past analyses of defensive medicine. Notably, it was difficult to ensure an objective approach because defensive medicine affects each physician and healthcare systems differently. Moreover, it involves differences and disagreements in diagnosis and/or treatment procedures (1,5,23). Additionally, individuals may have shown bias because of the need to evaluate themselves and consider the effects of their past traumatic experiences on their responses.

CONCLUSION

This study of defensive medicine among general surgeons in Turkey showed that the factors most able to predict changes and differences in defensive medicine approach levels were predictive attitude, regret concerning work in general surgery, and the type of institution in which the respondents worked. Field-specific problems should be addressed both individually and systematically. The establishment of large databases concerning defensive medicine should be a priority for determining future strategies and suggestions for improvement.

KAYNAKLAR

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