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Preoperative Anxiety in Patients Undergoing Elective Surgery During a Healthcare Crisis: A Referral Hospital Experience

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ABSTRACT

Objective: The psychological impact of healthcare crises is undoubted. Anxiety has a strong impact on the perioperative patients' well-being and their subsequent postoperative recovery. The aim of this survey was to assess preoperative anxiety and its accentuating factors in patients undergoing surgery during a healthcare crisis.

Method: This study is a cross-sectional observational study. All adult patients undergoing elective surgery during December 2021 were assessed for eligibility. We excluded patients with any diagnosed psychiatric comorbidities. Anxiety was recorded using the modified Preoperative Anxiety Scale (mPAS), with permission by the authors [1]. mPAS consists of 4 sections: (i) demographics, (ii) baseline anxiety trait, (iii) anxiety due to general preoperative factors and (iv) anxiety due pandemic-specific factors. We summarized the results using descriptive and inferential statistics.

Results: We included 116 patients, (60 males, 51.7% and mean age 60.6±15.5 years) who underwent major (27,23.3%), moderate (49,42.3%), and minor (40,34.5%) surgical interventions. Six patients were excluded due psychiatric disorders. Based on American Society of Anaesthesiologists Physical Status (ASA-PS) they were mostly classified as ASA PS II (62,53.4%) and ASA PS III (29,25%). At baseline, of the 110 patients who completed the questionnaire, 30% (n=33) suffered from baseline anxiety according to mPAS. Severity of planned surgery (n=24, 21.8%) represented a major anxiety source, which was statistically significant for patients undergoing major surgery (p=0.026). However, pandemic-related factors were responsible of anxiety in 36 (32.7%) patients. The female gender and the ASA grade were significantly associated with the levels of COVID-19 anxiety.

Conclusions: During a healthcare crisis 30% of the patients experienced anxiety before surgery. The preoperative anxiety was further aggravated due to pandemic-related factors.

Keywords: Anxiety, elective surgery, preoperative anxiety, prospective study, questionnaire

INTRODUCTION

Healthcare crises, such as pandemics and large-scale outbreaks of infectious diseases, pose significant challenges to medical systems worldwide. These crises often lead to widespread disruptions in healthcare delivery, as seen with more than 700 million cases and nearly 7 million deaths from a major global outbreak of COVID-19, which significantly strained healthcare resources (Chung et al. 2024). The fear of contracting the disease and measures such as local lockdowns profoundly affected the availability and quality of healthcare services (Tam et al. 2020). Many surgical centers had to reorganize and cancel elective surgeries, prioritizing life-threatening emergencies and urgent oncological surgeries to protect patients and staff and preserve ICU and general ward beds (Koroye et al. 2020).

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Healthcare crises have been associated with an increased likelihood of developing mental health issues, such as anxiety and depression (Colizzi et al. 2023). According to the World Health Organization (WHO), such crises can lead to a substantial increase in the prevalence of anxiety and depression worldwide (Autenrieth et al. 2024). The perioperative period is a well-recognized stressful occasion for most patients and is usually accompanied by some degree of perioperative anxiety (Shawahna et al. 2023). It may be expected that patients undergoing elective surgery during healthcare crises experience increased levels of anxiety. Indeed, studies have revealed that surgical patients often have high stress levels during such times, with several experiencing anxiety due to COVID-19 (Viola et al. 2021, Muştucu et al. 2023, Akgül et al. 2024). Moreover, questionnaire studies have revealed that patients experienced higher levels of preoperative anxiety during the COVID-19 pandemic compared to historical cohorts (Buonanno et al. 2022). A major proportion of patients in India (98%) have reported being anxious about contacting COVID-19 during and the perioperative period and possibly transmitting the infection to their loved ones (Prakash et al. 2024).

The aim of this questionnaire study was to discover the prevalence (Q1) and risk factors of preoperative anxiety (Q2) in patients undergoing elective surgery in a tertiary/referral University hospital in Greece, during a significant healthcare crisis.

METHODS

Study Design

This is a prospective questionnaire study which was conducted during the period of December 2021, the fourth COVID-19 wave for the Fifth Health Region, in a tertiary hospital in Greece. The study was approved by the Institutional Ethics Board of the University Hospital of Larisa (4693829/11/2021) and was registered in clinicaltrials. gov NCT05114967. The study was conducted according to the principles of the Helsinki declaration (World Medical Association 2013).

Eligibility Criteria

All adult patients (older than 18 years old) who underwent elective surgery during December 2021 in our institution were included in this study, as long as they had a negative COVID-19 Polymerase Chain Reaction (PCR) test. We excluded all patients who: 1) were under 18 years old, 2) had a positive PCR test for COVID-19, 3) had severe psychiatric illness diagnosed by a certified psychiatrist, including generalized anxiety disorder, major depressive disorder, personality disorder or post-traumatic stress disorder, or 4) underwent emergency surgery. Written informed consent was obtained from all patients before their inclusion in the study.

Survey Tools

For this survey study, the modified Preoperative Anxiety Scale (mPAS) questionnaire developed by Viola et al. (2021), was used, after obtaining permission by the authors. The questionnaire was given to the eligible patients one day before the surgery, during the preanaesthetic assessment, by a resident anaesthesiologist. The mPAS questionnaire is divided in four sections. Section I contains demographic data (age, gender, level of education, familial status, American Society of Anesthesiologists Physical Status (ASA-PS), and occupation), as well as questions pertaining to the kind of programmed surgery, the use of psychiatric, psychotropic or addictive substances/drugs and their COVID-19 vaccination status. Section II (5 questions) contained questions regarding the baseline anxiety levels of the patients, Section III (10 questions) contained questions regarding the patients' anxiety about preoperative factors and Section IV (9 questions) contained questions regarding the patient's anxiety about the healthcare crisis. These sections contained questions with a minimum score of 1 and a maximum score of 4. Section II had a maximum score of 20, Section III had a maximum score of 40 and Section IV had a maximum score of 36. Patients who scored more than 10 in Section II were regarded as having increased baseline anxiety levels. Patients who scored more than 20 in Section III were regarded as having anxiety due to preoperative factors and patients who scored more than 18 in Section IV were regarded as having anxiety due to the pandemic.

Statistical Analysis

The distribution of continuous variables was assessed for normality using the Shapiro-Wilk test, which is suitable for our sample size of 116 patients. Continuous data that were normally distributed are presented as mean ± standard deviation (SD), while non-normally distributed data are presented as median [interquartile range (IQR)]. Categorical variables are presented as frequencies and percentages. Bivariate analyses were performed to investigate potential associations between each independent variable and the presence of preoperative anxiety. For categorical independent variables, associations with preoperative anxiety were assessed using Chi-square tests of independence. A univariate and a multivariate logistic regression analysis identified potential risk factors for the occurrence of COVID-associated anxiety among surgical candidates. Variables demonstrating statistical significance ($p<0.05$) in the univariate analyses or deemed clinically relevant were included in the multivariate binary logistic regression model. Our pre-study sample size calculation was based on a desired 95% confidence level and

a 5% margin of error for an estimated prevalence of 30%, accounting for a 15% non-response rate, which indicated a need for approximately 380–400 participants. All statistical analyses were performed using R statistical software version 4.2.2. The significance level was set at $p<0.05$ for all tests, and all tests were two-tailed.

RESULTS

Study Sample Description

In total, 122 patients were considered as possible participants in this study. However, six were excluded due to psychiatric illness, as diagnosed by a certified psychiatrist, including four patients with generalized anxiety disorder and two patients with major depressive disorder. After their exclusion, 116 patients were included in the final analysis. The flowchart of the study is depicted in Fig. 1. Out of the 116 patients included, 60 were male (51.7%) and 56 were female (48.3%). The mean age of our patients was 60.6±15.5 years. Of note, 6 (5.17%) participants were healthcare workers. Most of our patients were either primary school graduates (38, 32.75%) or secondary school graduates (37, 31.89%). Moreover, almost half of our patients were retired (48, 41.37%), while 20 (17.24%) were unemployed and 48 (41.37%) were employed. The majority of our patients were married (76, 65.51%) and most of them had children (81.89%). Twenty-five patients (21.55%) were smokers and 9 (7.75%) consumed alcohol daily. Out of these 34 patients, 8 (23.52%) increased their daily substance use after they learned about their upcoming surgery. Finally, most of our included patients (101, 87.1%) were vaccinated against COVID-19. Baseline demographic data are reported on Table 1.

Surgical and Anesthetic Risk Classification

Most of our patients underwent moderate surgical interventions (42.3%), while 23.3% and 34.5% underwent major and minor interventions, respectively. The severity of each surgical procedure was assigned based on the European Society of Cardiology (ESC) and European Society of Anaesthesiology (ESA) joint guidelines of 2014 (Kristensen et al. 2014). This risk stratification is based on the possibility of major cardiovascular events occurring after a specific surgical procedure. Based on ASA-PS, they were most commonly classified as ASA-PS II (62 patients, 53.4%) and ASA-PS III (29. 25%), while only 18 patients (15.51%) were classified as ASA-PS I and only 7 patients (6.03%) were classified as ASA-PS IV. Furthermore, the majority of our patients had already undergone a previous surgery (84 patients, 72.41%). Baseline surgical data are reported on Table 2.

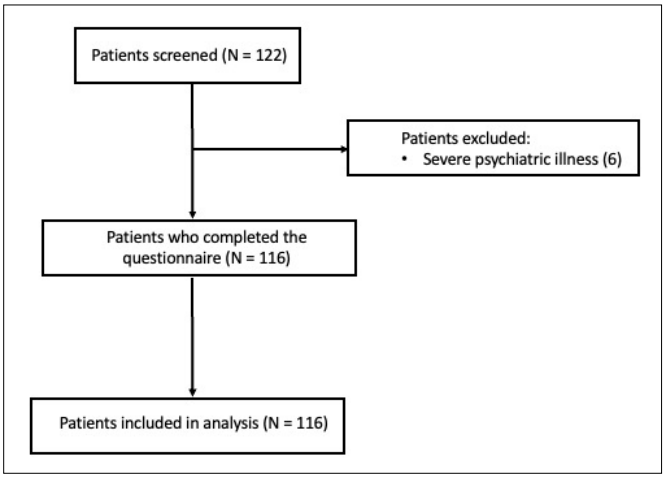

Figure 1. Figure depicting the flowchart of the study.

Table 1. Demographic data of patients who were included in the study

Demographic data	Count	Percentage (%)
Age (Years)	60±15.5	
Gender		
Male	60	51.7
Female	56	48.3
Healthcare workers	6	5.17
Education		
Primary school	38	32.8
Secondary school	37	31.9
Higher education	41	35.3
Employment		
Unemployed	48	41.37
Employed	20	17.24
Retired	48	41.37
Marital status		
Married	76	65.51
Unmarried	40	34.48
Smoker		
Yes	25	21.55
No	91	78.44
Alcohol use		
Yes	9	7.75
No	107	92.24
Increase in tobacco/ alcohol	8/34	23.52
COVID-19 vaccination		
Yes	101	87.1
No	5	4.31
Vaccination status unknown	10	

Prevalence of Anxiety (Q1)

Out of the 116 analyzed patients, 6 patients failed to complete the mPAS questionnaire sections. Thus, the prevalence analyses for Sections II, III, and IV were conducted using the remaining 110 complete responses. The prevalence of baseline preoperative anxiety, assessed by the mPAS, was 30% (n=33), with the remaining 70% (n=77) of patients not presenting with anxiety. mPAS scores for the entire cohort ranged from 5 to 17, with a mean of 8.1 (SD=3.11), and a median of 7. The

Table 2. Surgical data of patients who were included in the study

Surgical data	Count	Percentage (%)
ASA PS		
I	18	15.51
II	62	53.4
III	29	25
IV	7	6.03
Previous surgery		
Yes	84	72.41
No	32	27.58
Type of surgery		
General	26	22.41
Otorhinolaryngological/Fascial	20	17.24
Gynecological	14	12.06
Orthopedic	16	13.79
Vascular	13	11.2
Urological	12	10.34
Cardiac	6	5.17
Neurosurgery	6	5.17
Ophthalmological	2	1.72

*One patient had a combined general surgery + gynecological surgery

data demonstrated a non-normal distribution, as indicated by the Shapiro-Wilk test ($p < 0.001$).

The prevalence of anxiety specifically attributed to preoperative factors was 21.8% (n=24) among the included patients, as assessed by mPAS. The scores for anxiety due to preoperative factors ranged from 10 to 34, with a mean of 15.99 (SD=5.36) and a median of 14.0. The distribution of these scores was found to be non-normal (Shapiro-Wilk test, $p < 0.001$).

The prevalence of anxiety directly attributed to the ongoing COVID-19 healthcare crisis was 32.7% (n=36) among the included patient cohort. Among the 110 participants providing data for this measure, self-reported anxiety levels specifically related to the COVID-19 pandemic ranged from 9 to 30. The mean score for this domain of anxiety was 15.28 (SD=5.09), with a median score of 15.0. Consistent with other psychological measures in this study, the distribution of COVID-19-related anxiety scores was non-normal, as indicated by a Shapiro-Wilk test ($p < 0.001$).

Predictors of COVID-19-Related Anxiety (Q2)

In the univariate analyses (Table 3), female gender was significantly associated with a lower likelihood of experiencing COVID-19-related anxiety compared to male gender (OR=0.431; 95% CI: 0.189 – 0.979; p=0.044). Patients classified as ASA Physical Status III showed a borderline significant association with lower odds of COVID-19 anxiety compared to ASA I patients (OR=0.233; 95% CI: 0.054 – 1.005; p=0.051). Interestingly, higher scores on baseline anxiety (OR=0.760; 95% CI: 0.657 – 0.879; p <0.001) and anxiety due to preoperative factors (OR=0.832; 95% CI: 0.759 – 0.911; p <0.001) were both significantly associated with reduced odds of reporting anxiety specifically related to COVID-19. Age, other ASA classifications (II and IV), various levels of education, marital status, occupation, substance abuse, vaccination status, and complexity of surgery did not demonstrate statistically significant associations with COVID-19-related anxiety in the univariate models.

Table 3. Predictors of preoperative anxiety. Univariate and multivariate analysis on factors that may influence postoperative anxiety

	Reference		Univariate (Odds ratio and 95% CI; p)	Multivariate (Odds ratio and 95% CI; p)
Age	Per unit		0.999 (0.973 – 1.026; 0.961)	
Gender	Female	Male	0.431 (0.189 – 0.979; 0.044)	0.194 (0.062 – 0.605; 0.005)
ASA	I	II	0.453 (0.117 – 1.750; 0.251)	0.356 (0.075–1.690; 0.194)
		III	0.233 (0.054 – 1.005; 0.051)	0.121 (0.019–0.753; 0.024)
		IV	0.2 (0.02 – 2.033; 0.174)	0.294 (0.015 – 5.736; 0.419)
Education	Elementary	Secondary	0.519 (0.188–1.434; 0.206)	
		Higher	0.722 (0.280 – 1.860; 0.5)	
Marital Status	Single	Married	0.336 (0.069 – 1.630; 0.170)	
Occupation	Unemployed	Private	1.697 (0.546 – 5.276; 0.361)	
		Retired	1.678 (0.548 – 5.140; 0.365)	
Substance abuse	No	Yes	1.481 (0.584 – 3.755; 0.408)	
Vaccination status	No	Yes	0.276 (0.059 – 1.296; 0.276)	
Complexity of Surgery	Minor	Moderate	0.517 (0.170 – 1.58; 0.246)	
		Major	0.517 (0.20 – 1.336; 0.173)	
Baseline anxiety	Per unit		0.760 (0.657 – 0.879; <0.001)	0.828 (0.682–1.006; 0.057)
Anxiety due to preoperative factors	Per unit		0.832 (0.759 – 0.911; <0.001)	0.892 (0.792–1.005; 0.060)

ASA: American Society of Anesthesiology CI: Confidence Interval

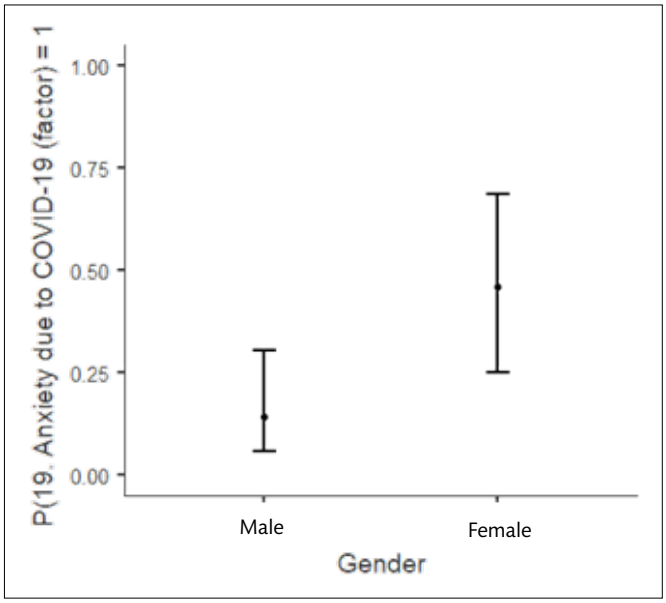

Figure 2. Probability of Anxiety Due to COVID-19 Across Gender Categories. Points represent the estimated probability, and error bars represent the 95% confidence intervals.

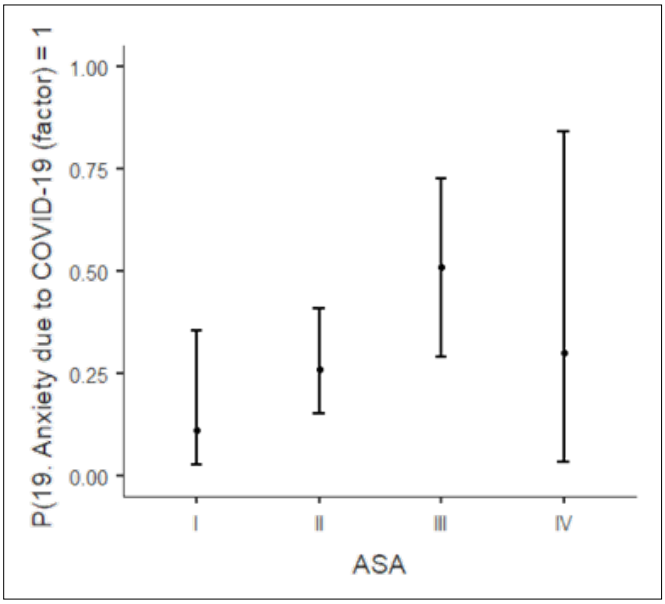

Figure 3. Probability of Anxiety Due to COVID-19 Across ASA Physical Status Categories. Points represent the estimated probability, and error bars represent the 95% confidence intervals.

In the multivariate model (Table 3), female gender remained an independent predictor of lower odds of COVID-19-related anxiety (Adjusted OR=0.194; 95% CI: 0.062 – 0.605; p=0.005) compared to male gender (Fig. 2). Similarly, ASA Physical Status III (compared to ASA I) was independently associated with significantly reduced odds of COVID-19 anxiety (Adjusted OR=0.121; 95% CI: 0.019 – 0.753; p=0.024) (Fig. 3). The anxiety levels by gender and ASA grade are depicted in Table 4 and Table 5. Although no longer strictly statistically significant at p<0.05 in the multivariate model, a trend of inverse association persisted for baseline anxiety (Adjusted OR=0.828; 95% CI: 0.682 – 1.006; p=0.057) and anxiety due to preoperative factors (Adjusted OR=0.892; 95% CI: 0.792 – 1.005; p=0.060), suggesting that higher scores in these general anxiety domains were associated with somewhat lower odds of anxiety specifically attributed to COVID-19, after accounting for other factors.

Table 4. Descriptives statistics for anxiety due to COVID-19 by gender

	Male	Female
Mean (SD)	14.47 (4.63)	16.09 (5.43)
Median	13	16

Table 5. Descriptives statistics for anxiety due to COVID-19 by ASA grade

	ASA I	ASA II	ASA III	ASA IV
Mean (SD)	14.56 (3.50)	14.55 (4.84)	17.12 (5.83)	18.00 (—)
Median	14.50	13.00	17.00	18.00

DISCUSSION

According to our prospective questionnaire study, approximately one fifth of our patients experienced anxiety due to preoperative factors (21.8%). Moreover, patients undergoing major surgery were statistically significantly more likely to suffer from increased anxiety rates (p=0.026). In addition, factors related to the pandemic were associated with increased anxiety rates in a proportion of our patient group (32.7%).

Anxiety is defined as an unpleasant feeling of worry, fear, or apprehension (Abate et al. 2020). The perioperative period is a major cause of anxiety in patients undergoing surgery, often eliciting emotional and physiological responses (Mulugeta et al. 2018). While anxiety of a small degree is to be expected in the majority of surgical patients, moderate or high levels of anxiety can have detrimental effects on the perioperative care of those patients (Mulugeta et al. 2018). Thus, perioperative anxiety has been associated with increased postoperative pain, poor wound healing, hemodynamic instability, increased length of stay, and decreased patient satisfaction (Engda et al. 2022). A special burden on anxiety and mental health in general has been added due to the fear of contacting viruses causing global pandemic, such as COVID-19 of influenza, or experiencing severe complications of the disease.

The prevalence of perioperative anxiety in the surgical population varies widely depending on the population being studied. It has been reported that perioperative anxiety is experienced by 16.7% up to 97% of surgical patients (Engda et al. 2022). However, a recent systematic review and meta-analysis by Abate et al. including 28 studies reported that the global pooled prevalence of perioperative anxiety

is 48% (Abate et al. 2020). In our cohort, 30% of patients experienced some kind of anxiety, with 21.8% experiencing anxiety related to perioperative factors. Our findings appear to be consistent with another Greek study which reported that among female patients who underwent breast surgery, 35.8% had a moderate level of anxiety, and 17.6% had a high level of anxiety (Katsohiraki et al. 2020).

According to the current literature, several preoperative risk factors have been associated with an increased likelihood of developing perioperative anxiety. Female gender, illiteracy and negative experiences with surgery or anaesthesia have previously been reported to affect the levels of perioperative anxiety experienced by patients (Laufenberg-Feldmann and Kappis 2013, Eberhart et al. 2020, Engda et al. 2022)). In a cross-sectional survey of more than three thousand patients female gender had the strongest connection with preoperative anxiety (Eberhart et al. 2020). It has been proposed that the female gender is more susceptible to preoperative anxiety due to a higher incidence of baseline anxiety, as well as sex-specific behavioral patterns (Laufenberg-Feldmann and Kappis 2013). However, in our study, female patients were less likely to experience anxiety during the perioperative period. This disparity could maybe be explained by the small number of patients in our study or the fact that geographical, political and socioeconomic factors may influence the association of gender with anxiety.

Previous negative experiences with anaesthesia or surgery have been associated with more severe preoperative anxiety, since patients are more afraid of "losing control" or "gaining consciousness" during anaesthesia (Eberhart et al. 2020). The mPAS questionnaire did not contain any questions concerning previous negative experiences with surgery or anaesthesia. Future questionnaires could potentially incorporate this factor in order to ascertain whether negative experience with anaesthesia could be a major determinant of preoperative anxiety.

In this study, patients scheduled to undergo major operations were statistically significantly more likely to experience higher levels of anxiety. This finding is consistent with previous surveys. Laufenberg-Feldmann and Kappis reported that patients undergoing high-risk surgeries were more likely to have preoperative anxiety based on the Amsterdam Preoperative Anxiety and Information Scale (APAIS) (Laufenberg-Feldmann and Kappis 2013). Similarly, the authors concluded that patients undergoing neurosurgical and cardiothoracic procedures were more likely to develop anxiety due to preoperative factors. The incidence of preoperative anxiety in patients scheduled to undergo coronary artery bypass grafting (CABG) has been reported to be as high as 50% (Matthias and Dharmanbandhu 2012).

Based on the results of this survey, more than 30% of the included patients experienced anxiety due to COVID-19 related factors. Hence, a much higher incidence is reported compared to that of Viola et al., who reported that only 7% of their patients felt anxiety due to factors relating to the pandemic (Viola et al. 2021). However, it should be highlighted that their study was conducted during a period with significantly reduced pandemic cases and eased lockdown measures. In contrast, this study was conducted during the fourth and toughest wave of COVID-19 in our country, when the load of COVID-19 cases was severe. Our results are more in line with the study by Doglietto et al. who reported that at least 30% of their patients had pandemic-related anxiety (Doglietto et al. 2020). Although that study included only neurosurgical patients, their results may resemble ours more closely, since the survey was conducted in the immediate post-lockdown phase in a region with a high incidence of pandemic cases. Moreover, in the study by Viola et al., the majority of the patients underwent major surgery related to malignant diseases and, thus, may have been more concerned with their primary disease than the possibility of contracting a severe disease.

The high prevalence of preoperative anxiety during the COVID-19 pandemic can also be showcased by the study of (Prakash et al. 2024). In this study, 112 patients were collected during the period of April 2020 to March 2022, which covered the first two years of the pandemic and also included the period of our own study. The majority of patients experienced at least mild fear concerning surgery (approximately 63%), while a quarter of the patients experienced moderate fear and the minority reported strong or extreme fear. In comparison with pre-pandemic data, this study found increased anxiety levels during the pandemic, highlighting the added stress experienced by patients undergoing surgery during a healthcare crisis.

Another questionnaire study compared the preoperative anxiety of patients undergoing surgery during the period of May 2021 to November 2021 to a historical cohort (Buonanno et al. 2022). During the pandemic, trait anxiety was significantly higher. Anxiety trait is a stable psychological characteristic of a patient, usually affected by distressing events or factors. Thus, patients were more likely to experience anxiety trait during the COVID-19 pandemic, especially due to the strict measures taken by the institution in which the study took place to avoid infection spread. The only subgroups of patients that did not experience higher anxiety levels during the COVID-19 pandemic is the subgroup of patients aged 50–59 years old and the patients undergoing minor surgery. This finding is in accordance with our results, since in our cohort, patients who underwent major surgery were statistically more likely to experience anxiety.

Not all factors associated with the pandemic seem to cause anxiety to patients in the preoperative setting. Concerning demographic factors, in the study by Viola et al. (2021), patients who were not educated or educated up to middle school were four times more likely to experience preoperative anxiety due to the healthcare crisis, while single (divorced or unmarried) patients were five times more likely to experience anxiety. Also women were more likely than men to experience higher levels of anxiety during the pandemic compared to the period before the pandemic. In comparison, in our cohort there was no association between preoperative anxiety due to the healthcare crisis and age, socioeconomic status, educational status, type of surgery and severity of surgery, while the female gender was associated with a reduced prevalence of anxiety. This discrepancy is possibly a reflection of the cultural, socioeconomic and political differences between the three cohorts, since our study was conducted in Greece, while both the other studies were conducted in Italy.

According to Viola et al. (2021), the most important reasons for which patients felt anxiety were fear of prolonged treatment or length of hospital stay due to contracting a disease, fear of delaying their return to employment or fear of being away from their loved ones. Fear of contracting a disease in general was reported only in 5% of the patients in this study. Moreover, in the study by Doglietto et al., the patients experienced high levels of anxiety due to prolonged waiting time for their surgery, as well as fear of disease progression during their wait (Doglietto et al. 2020). In the questionnaire study by (Prakash et al. 2024), the most common reason why patients experienced anxiety was fear about surgical complications and postoperative pain. In our study, the most important reason for patients to feel anxiety were preoperative factors, which included fear of postoperative pain, fear of anesthetic or surgical complications and fear of death due to pre-existing conditions.

In our cohort, approximately 30% of patients experienced anxiety due to COVID-19 related factors, which included fear of contacting COVID-19, fear of transmitting COVID-19 to personnel or family and fear of experiencing complications due to the infection. This is in contrast with the study by (Prakash et al. 2024), in which the vast majority of patients (more than 90%) were anxious about contacting COVID-19, while 89% where anxious about transmitting COVID-19 to a relative. This is a significant difference, which highlights the effect of cultural, geographical and socioeconomic factors on patients' psychological health, especially stress levels. In our country, during the period of the study, strict measures were taken to ensure limited spread of COVID-19, which may explain why patients in Greece were less anxious about contacting the virus than the patients of (Prakash et al. 2024).

Limitations

Our study has certain limitations that should be acknowledged. Firstly, it is a small prospective study conducted in a single university hospital. Thus, its results may only apply to our specific population. It should be noted that the mPAS questionnaire has not been validated in the Greek population, which limits its reliability as a diagnostic tool in this specific population. Furthermore, our study was conducted during a period of one month during a global healthcare crisis. As such, our results may more accurately reflect the specific time period when it was conducted and should not be generalized to include all types of patients or different time periods. Moreover, patients with psychiatric illness diagnosed by a certified psychiatrist were excluded from the study, however no additional questionnaires were offered to the patients in order to ascertain whether they had any undiagnosed psychiatric illnesses or to estimate the severity of the disorder, because the questionnaire was aimed to be short and easy to conduct during the routine preoperative assessment. Thus, some patients with undiagnosed psychiatric illnesses may have been included in the final analysis. Since we used a pre-existing questionnaire, previous negative experiences with anaesthesia or surgery were not taken into account into the analysis of our results, which may impact our final analysis. It should also be mentioned that for some patient groups the number of patients was too small to conduct any further statistical analysis beyond presenting numerical values and percentages.

Equally important, our study failed the preset sample size requirements. the period of data collection during a significant healthcare crisis such as the COVID-19 pandemic presented unforeseen and substantial challenges to patient recruitment. Specifically, the tertiary University hospital environment, while ideal for diverse elective surgeries under normal circumstances, was heavily impacted by 1) Reduced Elective Surgical Volume Government Policy, 2) Increased Patient Reluctance to undergo elective procedures due to fear of infection, concerns about hospital safety, or the general stressful climate, and 3) Operational Constraints due to Strict infection control protocols. Consequently, despite our dedicated efforts, we were unable to reach the initially targeted sample size within the feasible data collection period. While the size of our cohort may be small, we believe that our significant findings remain credible. Similar small-sample studies have also been published in peer-reviewed journals, highlighting the fact that although their sample may be small, their clinical significance may be substantial (Amprachim et al. 2024; Kumari et al. 2024; Liang et al. 2025). Despite these limitations, we believe our study still offers valuable insights. It provides an estimate of perioperative anxiety prevalence and identifies key associated factors within a specific and challenging healthcare context in Greece, a scenario for

which data is relatively scarce. This information is crucial for understanding patient experiences during crises and for informing future interventions and resource allocation. We also confirm that the data collected from the 116 participants was meticulously gathered, maintaining high quality and completeness.

CONCLUSIONS

Our questionnaire study revealed that patients undergoing elective surgery during a global pandemic experienced significant levels of preoperative anxiety, with those facing major surgeries being particularly affected. It is apparent that fear of contacting an infectious disease imposed a significant mental burden on patients who were scheduled for surgery, especially those about to undergo major surgical procedures. Preoperative factors such major surgery or socioeconomic factors such as healthcare or environmental crises could be assessed more thoroughly during the preoperative period in order to identify the patients more susceptible to severe preoperative anxiety. Future studies could more thoroughly explore what preoperative and environmental factors significantly influence preoperative anxiety and which interventions could be considered in order to successfully alleviate anxiety in high-risk patient groups.

Ethics Committe Approval: The study protocol was approved by the Ethics Committee of the University Hospital of Larissa, on the 21st of November 2021. with decision number 4693829/11/2021

Conflict of Interest: The authors declare no conflicts of interest.

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