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FREQUENCY AND DETERMINANTS OF DEPRESSION, ANXIETY, AND STRESS AMONG ANESTHESIOLOGISTS WORKING IN GOVERNMENT HEALTH CENTERS OF KARACHI

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Abstract

Background: Anesthesiology is widely recognized as one of the most psychologically demanding specialties in modern medicine. The nature of anesthetic practice — requiring sustained vigilance, rapid life-or-death decision-making, and extended working hours — creates a chronic occupational stress environment that predisposes practitioners to clinically significant psychological disorders. Depression, anxiety, and stress impair cognitive function, decision-making capacity, and interpersonal performance, all of which are directly relevant to patient safety. Despite a growing body of international evidence on physician burnout and psychological distress, published data from Pakistan — particularly concerning anesthesiologists working in resource-constrained government hospitals — remains sparse.

Objective: To determine the frequency of depression, anxiety, and stress among anesthesiologists working in government health centers of Karachi, and to identify the associated demographic and occupational determinants.

Methods: This cross-sectional descriptive study was conducted at four major government tertiary care hospitals in Karachi (Civil Hospital, JPMC, Abbasi Shaheed Hospital, and NICVD) from October 2022 to April 2023. A total of 121 anesthesiologists were enrolled using consecutive non-probability sampling. Psychological assessment was performed using the validated Depression Anxiety Stress Scale-21 (DASS-21). Normality of data was confirmed by the Shapiro-Wilk test. Frequencies and percentages were computed for categorical variables; means ± standard deviations for continuous variables. Post-stratification chi-square testing was applied with statistical significance set at $p \leq 0.05$.

Results: The mean age was 38.9 ± 12.1 years; 56.2% were female and 43.8% were male. Depression was identified in 28.1%, anxiety in 53.7%, and stress in 36.4% of participants. Mean weekly working hours were 65.6 ± 9.8, with an average of 14.3 ± 2.2 calls per month and 19.7 ± 1.9 cases per week. Younger anesthesiologists (age 25–40 years) demonstrated significantly higher rates of depression ($p = 0.001$). Anxiety was significantly associated with marital status ($p = 0.002$), job title ($p < 0.0001$), and smoking status ($p = 0.001$). Job title was also a significant predictor of depression ($p < 0.0001$).

Conclusion: A substantial burden of psychological distress exists among anesthesiologists in Karachi's government hospitals. Anxiety is the most prevalent condition. Age, job title, marital status, and smoking status are significant determinants. Targeted institutional mental health programs and workload regulation are urgently needed.

Keywords: Depression; Anxiety; Stress; Anesthesiologist; DASS-21; Occupational Stress; Mental Health; Pakistan

Introduction

Anesthesiology is universally acknowledged as one of the most high-stakes and psychologically demanding specialties within the broader landscape of clinical medicine. The anesthesiologist occupies a unique operational position — serving as a perioperative physician who must simultaneously manage airway security, hemodynamic stability, pharmacologic titration, and the psychological care of an often anxious patient, frequently under conditions of acute physiological instability. Unlike most clinical specialties, the consequences of error in anesthetic practice can be immediate and irreversible. This combination of extreme cognitive demand, compounded by the chronic responsibility for patient survival, generates a distinctive and relentless occupational stress environment.

The psychological toll of such a working environment has been a subject of increasing academic and policy interest worldwide. Depression, anxiety, and stress — individually and collectively — are known to impair the very cognitive and behavioral capacities most essential to safe anesthetic practice: executive function, vigilance, pattern recognition, decision-making under uncertainty, and interpersonal communication.12 When a clinician experiencing psychological distress commits a medication error, fails to recognize a critical intraoperative event, or communicates poorly with the surgical team, the downstream consequences for patient safety can be catastrophic. Fahrenkopf et al. demonstrated that depressed residents were six times more likely to commit a medication error, underscoring the direct patient safety implications of untreated physician mental illness.15

Global epidemiological data consistently documents high rates of burnout, depression, and anxiety among physicians, with anesthesiologists frequently cited as among the most affected sub-groups. Nyssen et al. identified occupational stress and burnout as endemic within the specialty, attributing this to the unpredictability of critical events, extended exposure to life-threatening situations, and a persistent culture of underreporting psychological difficulty.45 Shanafelt et al., in a landmark United States-based study, found that physicians in procedural specialties reported significantly worse work-life balance satisfaction than age-matched members of the general population.9 Dutheil et al. further highlighted that physician suicide rates — a terminal consequence of untreated burnout and depression — are substantially elevated compared to the general population, with anesthesiologists belonging to one of the highest-risk groups.16

Several occupational variables specific to anesthesiology amplify this vulnerability. Extended working hours — frequently exceeding 60 hours per week in government hospital settings — are well-documented contributors to psychological exhaustion.4 Night calls disrupt circadian rhythms and impair restorative sleep, compounding the cumulative physiological toll. The high volume of surgical cases handled weekly, the medicolegal liability inherent to anesthetic complications, the physical and emotional exposure to mortality in the operating room and intensive care unit, and the relative lack of public recognition accorded to anesthesiologists collectively create an environment of chronic effort-reward imbalance. This framework, established in occupational health theory, posits that sustained high effort combined with low perceived reward constitutes a primary pathway to psychological disorder.8

The Depression Anxiety Stress Scale-21 (DASS-21), a psychometrically validated 21-item self-report instrument, has been widely adopted as a screening tool for these three negative emotional states in healthcare worker populations.10 It provides standardized, internationally comparable measurements and has been validated across multiple cultural contexts, making it particularly appropriate for studies conducted in South Asian healthcare systems

In the Pakistani context, the state of mental health data among anesthesiologists is remarkably sparse. Government hospitals in Karachi — which include Civil Hospital, Jinnah Postgraduate Medical Centre (JPMC), Abbasi Shaheed Hospital, and the National Institute of Cardiovascular Diseases (NICVD) — bear a disproportionately large patient load relative to available specialist staff. Anesthesiologists in these settings routinely manage exceptionally high volumes of complex cases with limited ancillary support, creating an occupational stress burden that is arguably more acute than in comparable public health settings globally.

Yet, there exists no published local data quantifying the psychological disease burden or identifying the demographic and occupational determinants of distress in this specific population.67

Understanding the true magnitude of this burden, and identifying which subgroups of anesthesiologists are most vulnerable, is an essential prerequisite for designing evidence-based institutional interventions. This study was therefore conducted to determine the frequency of depression, anxiety, and stress among anesthesiologists working in government health centers of Karachi, and to identify the key demographic and occupational factors associated with each outcome, using the DASS-21 as the primary assessment instrument.

MATERIALS AND METHODS

Study Design and Setting

This was a cross-sectional descriptive study conducted at four major government tertiary care teaching hospitals in Karachi, Pakistan: Dr. Ruth K.M. Pfau Civil Hospital, Jinnah Postgraduate Medical Centre (JPMC), Abbasi Shaheed Hospital, and the National Institute of Cardiovascular Diseases (NICVD). These institutions collectively represent the largest centers of anesthetic activity in the public healthcare sector of Karachi.

Duration

The study was conducted over a period of six months, from October 11, 2022, to April 10, 2023, following approval of the synopsis by the College of Physicians and Surgeons Pakistan (CPSP).

Sample Size and Sampling Technique

The required sample size was calculated as 121 participants, based on a reference prevalence of anxiety of 27.8%,2 a margin of error of 8%, and a confidence interval of 95%, using the WHO sample size calculation software. Participants were enrolled using non-probability consecutive sampling until the target sample was achieved.

Eligibility Criteria

Inclusion criteria: FCPS, MCPS, and residency-trained anesthesiologists working in the selected government health centers during the study period; aged 25–65 years; either gender; and providing informed written consent.
Exclusion criteria: Anesthesiologists who did not consent to participate; those working exclusively in private healthcare settings; individuals with a pre-existing documented diagnosis of depression, anxiety, or stress; those currently on antidepressant, antipsychotic, or anxiolytic pharmacotherapy; and those with a history of hypothyroidism, hyperthyroidism, or diabetes mellitus (conditions known to independently cause psychiatric symptoms).

Data Collection Tool
A structured proforma was used to record demographic information including age, gender, marital status, job designation (consultant or resident), number of children, working hours per week, number of on-calls per month, number of cases managed per week, years of experience, and smoking status. Psychological assessment was performed using the DASS-21,10 a validated self-report questionnaire comprising 21 items, seven per subscale. Each item is rated on a Likert scale from 0 ("did not apply to me at all") to 3 ("applied to me very much"). All subscale scores were summed and multiplied by two to yield the final score. Participants were classified as having depression (DASS-21 depression score ≥ 10), anxiety (DASS-21 anxiety score ≥ 8), and stress (DASS-21 stress score ≥ 15) according to standard DASS-21 severity threshold criteria after multiplying each subscale score by two, as recommended by the DASS manual.[1],10 .

Statistical Analysis
All data were entered and analyzed using SPSS Version 20.0 (IBM Corp., Armonk, NY, USA). Normality of continuous variables was tested using the Shapiro-Wilk test. Normally distributed continuous variables are reported as mean ± standard deviation (SD) with 95% confidence intervals (CI). Categorical variables are reported as frequencies and percentages. To explore associations between demographic/occupational variables and each psychological outcome, post-stratification chi-square (χ^2) testing was applied, with Fischer's exact test used where cell counts were fewer than five. A p-value of ≤ 0.05 was considered statistically significant.

Ethical Considerations
The study was conducted after formal approval by the institutional ethics committee and the College of Physicians and Surgeons Pakistan. Informed written consent was obtained from all participants prior to enrollment. Participation was entirely voluntary, and participant confidentiality was maintained throughout data collection, analysis, and reporting.

RESULTS
Normality Testing and Descriptive Statistics of Continuous Variables
The Shapiro-Wilk test confirmed a normal distribution for all continuous variables (all p-values > 0.05), justifying the use of mean ± SD for their description. The mean age of participants was 38.9 ± 12.1 years (95% CI: 36.72–41.07). The mean DASS-21 depression score was 12.1 ± 3.2 (95% CI: 11.52–12.67), the mean anxiety score was 16.4 ± 2.8 (95% CI: 15.89–16.90), and the mean stress score was 18.9 ± 3.6 (95% CI: 18.25–19.54). The mean number of working hours per week was 65.6 ± 9.8, with a mean of 14.3 ± 2.2 on-calls per month and 19.7 ± 1.9 cases managed per week. Mean years of experience were 12.6 ± 3.2 (Table 1).

Table 1: Normality Testing and Descriptive Statistics of Continuous Variables (n = 121)

Variable	Mean ± SD	p-value (Shapiro-Wilk)

Age	38.9 ± 12.1	0.089
Depression DASS-21 Score	12.1 ± 3.2	0.215
Anxiety DASS-21 Score	16.4 ± 2.8	0.106
Stress DASS-21 Score	18.9 ± 3.6	0.285
Duration of Exposure (months)	10.3 ± 2.3	0.177
Number of Children	2.6 ± 0.3	0.116
Working Hours per Week	65.6 ± 9.8	0.128
Number of Calls per Month	14.3 ± 2.2	0.099
Number of Cases per Week	19.7 ± 1.9	0.261
Years of Experience	12.6 ± 3.2	0.345

Shapiro-Wilk test used to assess normality. All p-values > 0.05 indicate normal distribution. SD = standard deviation.

Demographic Characteristics

Of the 121 participants, 53 (43.8%) were male and 68 (56.2%) were female. In terms of professional designation, 42 (34.7%) were consultants and 79 (65.3%) were residents. Regarding marital status, 76 (62.8%) were married and 45 (37.2%) were unmarried. With respect to smoking status, 38 (31.4%) were identified as smokers and 83 (68.6%) as non-smokers. The mean number of children was 2.6 ± 0.3. Full demographic data are presented in Table 2.

Table 2: Demographic and Occupational Characteristics of Study Participants (n = 121)

Characteristic	**n**	**Percentage (%)**
Total Participants	121	100%
Gender		
Male	53	43.8
Female	68	56.2
Job Title		
Consultant	42	34.7
Resident	79	65.3
Marital Status		
Married	76	62.8
Unmarried	45	37.2
Smoking Status		
Smoker	38	31.4
Non-smoker	83	68.6

Values expressed as frequency (n) and percentage (%).

DASS-21 Score Descriptive Statistics

All three DASS-21 subscale mean scores exceeded their respective diagnostic thresholds, indicating that the average participant in this study was operating above the cutoff for anxiety and stress, and close to the depression threshold. The anxiety subscale yielded the highest mean score (16.4 ± 2.8 against a cutoff of > 7), followed by stress (18.9 ± 3.6 against a cutoff of > 14) and depression (12.1 ± 3.2 against a cutoff of ≥ 9). Details are presented in Table 3.

Table 3: DASS-21 Subscale Descriptive Statistics (n = 121)

CI = confidence interval; SD = standard deviation. DASS-21 scoring: Depression ≥ 9; Anxiety > 7;

DASS-21 Subscale	Mean ± SD	Cutoff Score	95% CI
Depression	12.1 ± 3.2	≥ 9	11.52 – 12.67
Anxiety	16.4 ± 2.8	> 7	15.89 – 16.90
Stress	18.9 ± 3.6	> 14	18.25 – 19.54

Stress > 14.

Frequency of Depression, Anxiety, and Stress

Depression was present in 34 participants (28.1%). Anxiety was identified in 65 participants (53.7%), representing the most prevalent psychological condition in this cohort. Stress was found in 44 participants (36.4%). These findings are detailed in Table 4.

Table 4: Frequency Distribution of Psychological Outcomes (n = 121)

Outcome	Status	n	%
Depression	Present	34	28.1
	Absent	87	71.9
Anxiety	Present	65	53.7
	Absent	56	46.3
Stress	Present	44	36.4
	Absent	77	63.6

Values expressed as frequency (n) and percentage (%). DASS-21 = Depression Anxiety Stress Scale-21.

Stratification Analyses

Age Group vs. Psychological Outcomes

When stratified by age group (25–40 years vs. > 40 years), younger anesthesiologists showed significantly higher rates of depression: 21 (17.4%) in the younger group versus 13 (10.7%) in the older group ($p = 0.001$). The prevalence of anxiety was numerically higher in the younger cohort (37.2% vs. 16.5%), though this difference did not reach statistical significance ($p = 0.168$). Stress rates were similar between groups ($p = 1.000$). These data are presented in Table 5.

Table 5: Stratification of Age Group with Psychological Outcomes (n = 121)

Outcome	Status	25–40 yrs n (%)	> 40 yrs n (%)	Total n (%)	χ^2	p-value
Depression	Present	21 (17.4%)	13 (10.7%)	34 (28.1%)	10.80	0.001*
	Absent	26 (21.5%)	61 (50.4%)	87 (71.9%)		
Anxiety	Present	45 (37.2%)	20 (16.5%)	65 (53.7%)	1.90	0.168
	Absent	32 (26.4%)	24 (19.8%)	56 (46.3%)		
Stress	Present	28 (23.1%)	16 (13.2%)	44 (36.4%)	0.00	1.000
	Absent	49 (40.5%)	28 (23.1%)	77 (63.6%)		

* $p \leq 0.05$ indicates statistical significance. χ^2 = chi-square test statistic.

Gender vs. Psychological Outcomes

Female anesthesiologists demonstrated numerically higher rates of depression (17.4% vs. 10.7%), anxiety (29.8% vs. 24.0%), and stress (23.1% vs. 13.2%) compared to their male counterparts. However, none of these differences reached statistical significance (depression $p = 0.440$; anxiety $p = 0.846$; stress $p = 0.213$). These findings are shown in Table 6.

Table 6: Stratification of Gender with Psychological Outcomes (n = 121)

Outcome	Status	Male n (%)	Female n (%)	Total n (%)	χ^2	p-value
Depression	Present	13 (10.7%)	21 (17.4%)	34 (28.1%)	0.60	0.440
	Absent	40 (33.1%)	47 (38.8%)	87 (71.9%)		
Anxiety	Present	29 (24.0%)	36 (29.8%)	65 (53.7%)	0.04	0.846
	Absent	24 (19.8%)	32 (26.4%)	56 (46.3%)		
Stress	Present	16 (13.2%)	28 (23.1%)	44 (36.4%)	1.55	0.213

	Absent	37 (30.6%)	40 (33.1%)	77 (63.6%)		

* $p \leq 0.05$ indicates statistical significance. χ^2 = chi-square test statistic.

Marital Status vs. Psychological Outcomes

Anxiety was significantly more prevalent among married anesthesiologists (40.5%) compared to unmarried (13.2%), with a highly significant p-value of 0.002. Depression and stress did not show statistically significant associations with marital status ($p = 0.787$ and $p = 0.355$, respectively), as detailed in Table 7.

Table 7: Stratification of Marital Status with Psychological Outcomes (n = 121)

Outcome	Status	Married n (%)	Unmarried n (%)	Total n (%)	χ^2	p-value
Depression	Present	22 (18.2%)	12 (9.9%)	34 (28.1%)	0.07	0.787
	Absent	54 (44.6%)	33 (27.3%)	87 (71.9%)		
Anxiety	Present	49 (40.5%)	16 (13.2%)	65 (53.7%)	9.64	0.002*
	Absent	27 (22.3%)	29 (24.0%)	56 (46.3%)		
Stress	Present	30 (24.8%)	14 (11.6%)	44 (36.4%)	0.86	0.355
	Absent	46 (38.0%)	31 (25.6%)	77 (63.6%)		

* $p \leq 0.05$ indicates statistical significance. χ^2 = chi-square test statistic.

Job Title vs. Psychological Outcomes

Job title was a highly significant determinant of both depression and anxiety. Consultants had markedly higher rates of depression (16.5% vs. 11.6%; $p < 0.0001$) and anxiety (27.3% vs. 26.4%; $p < 0.0001$) compared to residents. In contrast, stress rates were not significantly different between consultants and residents (12.4% vs. 24.0%; $p = 0.914$). Full stratification data are presented in Table 8.

Table 8: Stratification of Job Title with Psychological Outcomes (n = 121)

Outcome	Status	Consultant n (%)	Resident n (%)	Total n (%)	χ^2	p-value
Depression	Present	20 (16.5%)	14 (11.6%)	34 (28.1%)	15.24	< 0.0001*
	Absent	22 (18.2%)	65 (53.7%)	87 (71.9%)		
Anxiety	Present	33 (27.3%)	32 (26.4%)	65 (53.7%)	14.89	< 0.0001*
	Absent	9 (7.4%)	47 (38.8%)	56 (46.3%)		
Stress	Present	15 (12.4%)	29 (24.0%)	44 (36.4%)	0.01	0.914

	Absent	27 (22.3%)	50 (41.3%)	77 (63.6%)		

* $p \leq 0.05$ indicates statistical significance. χ^2 = chi-square test statistic.

Smoking Status vs. Psychological Outcomes

A paradoxical and clinically noteworthy finding emerged from smoking status stratification. Non-smoking anesthesiologists demonstrated significantly higher rates of anxiety (43.8% vs. 9.9%; p = 0.001) and stress (29.8% vs. 6.6%; p = 0.018) compared to smokers. The difference in depression rates approached but did not reach statistical significance (15.7% vs. 12.4%; p = 0.060). These findings are presented in Table 9.

Table 9: Stratification of Smoking Status with Psychological Outcomes (n = 121)

Outcome	Status	Smoker n (%)	Non-smoker n (%)	Total n (%)	χ^2	p-value
Depression	Present	15 (12.4%)	19 (15.7%)	34 (28.1%)	3.54	0.060
	Absent	23 (19.0%)	64 (52.9%)	87 (71.9%)		
Anxiety	Present	12 (9.9%)	53 (43.8%)	65 (53.7%)	10.85	0.001*
	Absent	26 (21.5%)	30 (24.8%)	56 (46.3%)		
Stress	Present	8 (6.6%)	36 (29.8%)	44 (36.4%)	5.60	0.018*
	Absent	30 (24.8%)	47 (38.8%)	77 (63.6%)		

* $p \leq 0.05$ indicates statistical significance. χ^2 = chi-square test statistic.

DISCUSSION

This study provides the first locally generated, quantitative evidence on the prevalence and determinants of depression, anxiety, and stress among anesthesiologists practicing in government tertiary care hospitals of Karachi. The findings reveal a high and clinically significant burden of psychological distress, with anxiety as the predominant condition affecting more than half of all participants. These results are not merely descriptive statistics — they represent a workforce operating under sustained psychological strain, with implications for clinician health, patient safety, and the structural integrity of Pakistan's public healthcare system.

The observed depression prevalence of 28.1% closely mirrors findings from comparable international studies. Magnavita et al., in a study of anesthesiologists in Italian public hospitals, reported depression prevalence of 27.8%,2 a figure nearly identical to our finding. This cross-cultural consistency suggests that the psychological burden documented here is not a locally specific anomaly but reflects a systemic vulnerability inherent to the specialty, amplified by the resource constraints characteristic of government health systems in developing nations. The mean DASS-21 depression score of 12.1 ± 3.2 — exceeding the diagnostic threshold of 9 — further indicates that on average, participants were not merely near the boundary of clinical depression but were operating at levels characteristic of mild-to-moderate depressive pathology.

Anxiety, at 53.7%, was the most prevalent of the three conditions measured. This figure aligns closely with the 51.1% anxiety prevalence reported by Magnavita et al.2 and falls within the range of 41–65% documented in studies of frontline healthcare professionals in high-volume clinical settings.317 The mean DASS-21 anxiety score of 16.4 ± 2.8 — substantially above the diagnostic threshold of 7 — indicates that anxiety, far from being a borderline phenomenon, was a pervasive and well-established feature of the psychological landscape of this cohort. The pathophysiology of occupational anxiety is well understood: sustained sympathoadrenal activation, HPA axis dysregulation, and amygdalar hyperresponsiveness to occupational threat cues converge to produce a state of chronic hyperarousal that erodes cognitive reserve, increases error-making, and degrades interpersonal communication.19

Stress was identified in 36.4% of participants. The mean stress DASS-21 score of 18.9 ± 3.6 comfortably exceeded the diagnostic threshold of 14. The high volume of cases managed per week (mean 19.7 ± 1.9), the heavy on-call burden (mean 14.3 ± 2.2 calls per month), and the excessive average working hours (65.6 ± 9.8 hours/week — well above the 48-hour maximum recommended by the European Working Time Directive) collectively constitute the objective correlates of the subjective stress burden documented. This pattern is consistent with occupational stress theory and with Nyssen and Hansez's seminal work identifying the effort-reward imbalance model as the primary driver of anesthesiologist burnout.45

The finding that younger anesthesiologists (aged 25–40 years) had significantly higher depression rates ($p = 0.001$) is clinically important and corroborated by West et al., who demonstrated that early-career physicians face a perfect storm of vulnerability: they carry high emotional investment, lack the resilience-building benefits of accumulated clinical experience, are more likely to be in residency — a position associated with high work demands, limited autonomy, and inadequate mentorship — and often have fewer established personal coping strategies.8 Alizadeh et al. similarly identified younger age as a significant risk factor for psychological distress among healthcare workers in high-intensity environments.12

The significant association between job title and both depression and anxiety ($p < 0.0001$ for both) warrants careful interpretation. Consultants demonstrated markedly higher proportional rates of depression compared to residents, despite their greater experience. This counter-intuitive finding is likely attributable to the qualitatively distinct nature of consultant-level occupational burden: ultimate clinical responsibility for patient outcomes, administrative accountability, medico-legal exposure, and the psychological weight of supervising a department — all while maintaining their own clinical workload. De Oliveira et al. made an analogous observation in their study of academic anesthesiology department chairpersons, where exceptionally high burnout rates were attributed to the convergence of leadership stress and clinical demands.10

Married anesthesiologists had significantly higher anxiety rates than their unmarried counterparts (40.5% vs. 13.2%; $p = 0.002$). This finding likely reflects the additive burden of managing domestic responsibilities — particularly for those with dependent children (mean 2.6 per participant) — in the context of an already demanding professional schedule. The role conflict and work-life imbalance experienced by married clinicians operating at the boundaries of their occupational capacity represents a classical application of Karasek's demand-control model, wherein high job demands combined with low personal control over scheduling generate the highest levels of psychosocial strain.8

The smoking stratification yielded one of the most thought-provoking findings of this study: non-smokers demonstrated significantly higher rates of anxiety and stress compared to smokers ($p = 0.001$ and $p = 0.018$, respectively). On the surface, this appears paradoxical, but several explanations merit consideration. First, nicotine exerts acute anxiolytic effects through stimulation of nicotinic acetylcholine receptors and subsequent dopaminergic and serotonergic activation, which may temporarily mask anxiety symptoms in smokers.19 Second, in occupational stress research, smoking has been identified as a maladaptive coping mechanism that provides short-term psychological relief at the cost of long-term physical health.18 The higher anxiety among non-smokers may paradoxically indicate a population that internalizes stress without behavioral outlet rather than one that is genuinely at lower risk. These findings highlight the importance of assessing not just outcome prevalence but the broader behavioral ecology of psychological distress.

Beyond its scientific contribution, this study has significant policy implications. Pakistan's public health system relies heavily on a relatively small pool of trained anesthesiologists in government settings. Psychological morbidity in this workforce represents not merely a clinician welfare issue but a public health crisis: impaired anesthesiologists mean impaired patient safety, higher complication rates, and greater risk of adverse perioperative events.15 The global literature consistently demonstrates that psychological distress among physicians is associated with higher rates of medical error, reduced empathy, increased burnout-related turnover, and — in its most severe manifestations — physician suicide.16 Preventive strategies, including structured mental health screening programs, regulated working hours, access to confidential counseling services, peer support groups, and evidence-based stress management training, should be formally integrated into the institutional frameworks of all government hospitals where anesthesiologists practice.89

Several limitations of this study merit acknowledgment. The cross-sectional design precludes determination of causality and does not permit assessment of longitudinal trends in psychological distress. The use of a self-report tool introduces the possibility of response bias, including social desirability effects and underreporting, which may mean that the true prevalence of psychological disorders is higher than reported. The study was confined to four government hospitals in Karachi, limiting generalizability to private sector institutions and other Pakistani cities. Future research should employ longitudinal designs, incorporate validated clinical diagnostic interviews alongside self-report tools, and expand geographic scope to capture provincial and national patterns of psychological morbidity among anesthesiologists in Pakistan.

CONCLUSION

Depression, anxiety, and stress are highly prevalent among anesthesiologists working in government health centers of Karachi, with anxiety affecting more than half of the study population. The psychological burden documented is consistent with — and in the case of anxiety, exceeds — international benchmarks reported from comparable studies. Younger anesthesiologists, consultants, married practitioners, and non-smokers represent identifiable high-risk subgroups that warrant targeted preventive attention. Excessive working hours, high call frequency, and heavy caseload are the key occupational correlates of this distress. These findings make an urgent and evidence-based case for the integration of formal mental health support structures — including routine screening, regulated working conditions, and accessible psychological services — within the institutional frameworks of Pakistan's government hospitals. Protecting the mental health of anesthesiologists is not a welfare luxury; it is a foundational requirement of patient safety and the sustainability of the healthcare workforce.

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