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ORIGINAL RESEARCH

Psychological impact of the COVID-19 pandemic on anaesthetists in an academic institution in South Africa

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Background: Anaesthesiology is considered to be a medical speciality that can result in high levels of stress. The COVID-19 pandemic required anaesthetists to rapidly adopt additional challenging roles. This study describes the psychological impact of the pandemic on anaesthetists and identified and compared factors associated with depression, anxiety, stress, and post-traumatic stress disorder (PTSD).

Methods: A cross-sectional study design was used. An anonymous questionnaire was used to collect data utilising convenience sampling and results were reported using descriptive statistics and logistic regression analysis. The order of importance for the sources of stress and organisational support was determined by calculating the median rank.

Results: The majority of the participants were between ages 31–40 (62.6%), male (59.8%), registrars (47.6%), had no comorbidities (73.8%), and had no known mental illness (79.9%). Having a previous diagnosis of a mental health illness was linked with greater levels of depression (OR [95% CI] = 4.50 [2.02–10.24], $p < 0.001$), anxiety(OR [95% CI] = 3.9 [1.7–9.0], $p = 0.001$), stress (OR [95% CI] = 3.8 [1.6–9.2], $p = 0.002$), and PTSD (OR [95% CI] = 5.4 [2.2–13.5], $p < 0.001$). Sources of stress identified included: insecure access to appropriate personal protective equipment, being exposed to COVID-19 at work, and taking the infection home to family.

Conclusion: Participants with a history of mental illness were predisposed to developing negative psychological symptoms as a result of the pandemic. The main source of stress identified was insecure access to appropriate personal protective equipment.

Keywords: Psychological, COVID-19, anaesthetists, depression, anxiety, stress, PTSD

Introduction

The coronavirus disease of 2019 (COVID-19) has brought about many challenges internationally with far-reaching economic and health consequences.[1,2] There is a high probability of mental and behavioural disorders as a result of pandemics.[1] Data recorded from earlier pandemics dating back to the era of the Spanish flu, and more recently the severe acute respiratory syndrome (SARS) pandemic, provides invaluable insight into potential psychological consequences and the impact on healthcare workers (HCWs).[3] The psychological impact reported by staff during a recent epidemic included exhaustion, sleeping difficulties, change in appetite, and irritability during the outbreak.[4]

Anaesthesiology is considered a speciality that can result in high levels of stress, work dissatisfaction, and burnout syndrome.[5] A study published in 2011 demonstrated a 28% incidence of occupational stress among medical practitioners, while a different study illustrated the severity of stress levels in anaesthetists as high as 50–96%.[6,7] At the University of the Witwatersrand, data showed that 22.2% of participants had depressive symptoms.[8]

The conventional role of the anaesthetist during COVID-19 has been diversified through personnel taking on substantial roles in offering services, including airway management teams, fast response resuscitation units, and point-of-care (POC) ultrasonography, with these activities often carrying the highest risk of COVID-19 transmission from the need to perform airway procedures.[9] Considering the role of anaesthetists and the predisposition to mental health illnesses, the psychological impact on anaesthetists is something that should be investigated so that appropriate psychological support can be provided to maintain a functional health system.

A substantial number of studies analysing the psychological impact of COVID-19 on HCWs has been conducted internationally, however data on South African anaesthetists are limited. This study aimed to determine the psychological impact of the COVID-19 pandemic on anaesthetists working in the Anaesthesiology Department at the University of the Witwatersrand as a result of the COVID-19 pandemic.

Methods

Study background and population

The Human Research Ethics Committee and other related authorities approved the conduct of this cross sectional study. Data was collected from November 2020 until April 2021 using a self-administered, anonymous questionnaire using convenience sampling.

The study population included all anaesthetists in the Department of Anaesthesia at the University of the Witwatersrand, which included 129 registrars, 43 training medical officers, and 84 consultants. The sample size of 164 was calculated using a 5%

margin of error and 95% confidence interval (CI), and assuming a 60% response distribution.

Questionnaire

The questionnaire was adapted from a previous study on the topic of Singapore during the COVID-19 pandemic.[10] The questionnaire that was developed and administered via the Research Electronic Data Capture (REDCap) online platform, consisted of six sections: participant information letter; demographic data; The Depression Anxiety and Stress Scale-21 (DASS-21) screening tool; Impact of Event Scale–Revised (IES-R) screening tool; sources of stress and organisational support desired; and details of support resources available at the department. Permission was obtained from the original authors of the screening tools.

The DASS-21 questionnaire is a validated screening tool which measures depression, anxiety, and stress.[11,12] Supplementary Table I illustrates the categorical system used to determine the degree of symptoms.[12] We analysed data as dichotomised variables and a score of > 9 indicated depression, > 7 anxiety, and > 14 stress. These values were used in studies done in Singapore and China reviewing the psychological impact of the COVID-19 pandemic.[10,13] The IES-R was designed and validated as a screening tool using a specific traumatic incident concerning the individual, however, not diagnosti for post-traumatic stress disorder (PTSD). It has three subscales (intrusion, avoidance, and hyperarousal) that are closely affiliated with PTSD symptoms with a score of ≥ 24 suggestive of PTSD.[14,15]

A published viewpoint illustrated the sources of stress and mental needs among HCWs throughout the pandemic.[16] Anaesthetists ranked the sources of stress from 1–8, and their psychological needs from 1–5, from most to least important.

Statistics

Demographic data was summarised using proportions and percentages. Outcome variables (DASS-21 subscales and IES-R) were also summarised using proportions and percentages when the scores were divided into ordinal severity scales or dichotomised according to the presence of the condition.

The DASS-21 subscale for depression, anxiety, and stress and the IES-R screening tool for PTSD symptoms were analysed as ordinal outcome measures by using the ordinal logistic regression model. The analysis of the psychological needs and organisational support included data from individuals with complete ranking matrices. Statement ranking is based on a median score for each statement. Analyses were completed using R v4. 0.4, and $p < 0.05$ was considered statistically significant.

Results

There were 164 responses and all were included in the study. Participants were predominantly between ages 31–40 (62.6%), male (59.8%) and registrars (47.6%) (Table I). The majority had no comorbidities (73.8%) and no known mental illness (79.9%). A total of 112 were exposed to COVID-19, whilst 29 (17.7%) participants tested positive for the virus. However, it is unknown whether these infections originated from exposure to positive patients or were community-acquired infections.

On psychological state enquiry, 19.6% of participants had symptoms indicative of depression, 12.9% had symptoms indicative of anxiety, 11% had symptoms of stress, and 17.9% had symptoms of PTSD (Table II).

Having a previous diagnosis of a mental health illness was linked with greater levels of depression (OR [95% CI] = 4.50 [2.02–10.24], $p < 0.001$) and anxiety (OR [95% CI] = 3.9 [1.7–9.0], $p = 0.001$). The presence of comorbidities and a previous diagnosis of a mental health illness were significantly associated with increased stress levels on the DASS-21 stress subscale (OR [95% CI] = 2.7 [1.3–5.8], $p = 0.008$ and OR [95% CI] = 3.8 [1.6–9.2], $p = 0.002$). The presence of a pre-existing mental health illness was related to the severe PTSD category (OR [95% CI] = 5.4 [2.2–13.5], $p < 0.001$). Parents with children had lower stress levels (OR [95% CI] = 0.4 [0.2–0.9], $p = 0.030$) than participants without.

Table I: Demographics of the participants

Variable	*n* (%)
Age	
18–25	1 (0.6)
26–30	33 (20.1)
31–40	102 (62.2)
41–60	19 (11.6)
> 60	9 (5.5)
Sex	
Male	98 (59.8)
Female	68 (40.2)
Level of training	
Medical officer	33 (20)
Registrar	78 (47.6)
Junior consultant (< 5 years of experience)	16 (9.8)
Senior consultant (> 5 years of experience)	37 (22.6)
Marital status	
Divorced/separated	3 (1.8)
Single	58 (35.4)
Married	103 (62.8)
Children	
Yes	69 (42.1)
No	95 (57.9)
Known diagnosis of a mental illness	
Yes	33 (20.1)
No	131 (79.9)
Presence of comorbidities	
Yes	43 (26.2)
No	121 (73.8)
Personal exposure to COVID-19	
I have been exposed to asymptomatic patients that have subsequently been tested positive for COVID-19	10 (6.1)
I have been exposed to COVID-19 positive patients	114 (69.5)
I have not been exposed to any known COVID-19 positive patients	11 (6.7)
I have tested positive for COVID-19	29 (17.7)

Table II: Severity of negative emotional states

DASS-21	Median (IQR)/*n* (%)
Depression	3 (1–8)
Normal	86 (52.4)
Mild	23 (14)
Moderate	25 (15.2)
Severe	7 (4.3)
Extremely severe	17 (10.4)
Missing	6 (3.7)
Anxiety	2 (0–5)
Normal	103 (62.8)
Mild	17 (10.4)
Moderate	15 (9.1)
Severe	6 (3.7)
Extremely severe	14 (8.5)
Missing	9 (5.5)
Stress	6 (3–9.8)
Normal	93 (56.7)
Mild	22 (13.4)
Moderate	16 (9.8)
Severe	14 (8.5)
Extremely severe	9 (5.5)
Missing	10 (6.1)
IES-R	**Median (IQR)/*n* (%)**
PTSD	10 (2–23)
No PTSD	110 (67.1)
PTSD is a clinical concern	10 (6.1)
PTSD	5 (3.0)
Severe PTSD	21 (12.8)
Missing	18 (11)

Common sources of stress were ranked by 107 participants. Access to appropriate personal protective equipment (PPE), being exposed to COVID-19 at work, and taking the infection home to family were ranked as the most important sources of stress (Table IV). Access to childcare during increased hours of work and school closures was ranked the least important, although 19 participants believed this was the most important cause of stress for them.

A total of 136 participants ranked their desired organisational support to resolve concerns during the pandemic. The organisational support item ranked as the most important was "Protect me" (Table V). This option encompassed reducing the risk of infection by organisations providing PPE and having contingency plans.

Discussion

Our study surveyed the psychological impact of the pandemic in a population where the majority of participants were registrars, male, single and between the ages of 31–40. We found that a diagnosis of mental health illness was associated with negative emotional states during the pandemic with an adjusted odds ratio (OR) of 3.8–5.4 for the various symptoms. Approximately a quarter of the participants in our study had a history of mental health illness. Our data is supported by literature that illustrates that a history of mental illness will predispose a person to further mental illness.[17] A recent study has also demonstrated that being affected by one mental disorder increased the risk of developing another.[18] In South Africa, a recent report has demonstrated a higher prevalence of PTSD in participants with a pre-existing mental health condition during the pandemic.[19]

Evidence has shown that the presence of comorbidity when diagnosed with COVID-19 correlates with poor clinical outcomes and/or mortality.[20,21] Our study found that participants with a comorbid disease had greater levels of stress, hence we can attribute greater levels of stress, which can be attributed to fear of morbidity or mortality. Diabetes, HIV, chronic kidney disease, and chronic liver disease were associated with mortality

Table III: Negative emotional states associated with demographic characteristics

Variable	Depression		Anxiety		Stress		PTSD	
	uOR 95% CI	*p*-value	uOR 95% CI	*p*-value	uOR 95% CI	*p*-value	uOR 95% CI	*p*-value
Sex/male	0.657 (0.33–1.30)	0.232	0.49 (0.22–1.07)	0.079	1.17 (0.57–2.42)	0.669	0.86 (0.33–2.05)	0.680
Level of training								
Medical officer	1		1		1		1	
Registrar	2.59 (1.10–6.45)	0.033	2.20 (0.85–6.15)	0.115	1.78 (0.75–4.43)	0.201	1.89 (0.622–6.571)	0.283
Junior consultant	1.85 (0.51–6.47)	0.337	1.85 (0.49–6.75)	0.354	4.96 (1.41–17.75)	0.012	2.43 (0.527–11.335)	0.249
Senior consultant	1.53 (0.55–4.35)	0.412	1.47 (0.47–4.78)	0.511	1.00 (0.33–3.03)	0.998	1.45 (0.353–6.158)	0.605
Marital status								
Married	1.11 (0.54–2.31)	0.771	0.85 (0.39–1.86)	0.676	1.62 (0.77–3.48)	0.211	1.59 (0.63–4.26)	0.335
Children								
Yes	0.70 (0.34–1.45)	0.344	0.81 (0.36–1.79)	0.605	0.43 (0.19–.092)	0.030	0.66 (0.26–1.63)	0.374
Comorbidities								
Yes	1.78 (89–3.56)	0.100	1.45 (0.67–3.08)	0.343	2.74 (1.29–5.78)	0.008	1.71 (0.71–4.05)	0.223
Mental health illness								
Yes	4.50 (2.02–10.24)	< 0.001	3.89 (1.69–9.04)	0.001	3.83 (1.61–9.23)	0.002	5.40 (2.19–13.51)	< 0.001

uOR – unadjusted odds ratio

Table IV: Sources of stress amongst anaesthetists[16]

Source of stress	Statement ranking	Median rank	Number of participants *n* (%)	
			Rank 1	Rank 8
Being exposed to COVID-19 at work and taking the infection home to your family	1	2	50 (32.5)	12 (8.9)
Access to appropriate personal protective equipment	1	2	49 (31.8)	4 (3)
Uncertainty that your organisation will support/take care of your personal and family needs if you develop infection (e.g. sick leave days approved)	3	4	9 (5.8)	9 (6.7)
Being able to provide medical care if deployed to a new area (COVID-19 teams or ICU)	4	5	10 (6.5)	8 (6)
Support for other personal and family needs as work hours and demand increase (food, hydration, lodging, transportation)	4	5	7 (4.5)	5 (3.7)
Not having rapid access to testing if you develop COVID-19 symptoms and concomitant fear of propagating infection at work	4	5	2 (1.3)	5 (3.7)
Lack of access to up-to-date information and communication	7	6	8 (5.2)	30 (22.2)
Access to childcare during increased hours of work and school closures	8	7	19 (12.4)	67 (49.6)

Table V: Organisational support desired addressing psychological needs of anaesthetists[16]

Organisational support desired	Statement ranking	Median ranking	Number of participants *n* (%)	
			Rank 1	Rank 5
Protect me	1	2	72 (45.6)	10 (7)
Hear me	2	3	32 (20.2)	28 (19.7)
Support me	2	3	30 (19)	12 (8.5)
Prepare me	2	3	12 (7.6)	21 (14.8)
Care for me	5	5	12 (7.6)	71 (50)

according to The African COVID-19 Critical Care Outcomes Study, with similar findings in international literature.[20-22]

A study conducted among anaesthetists in India identified numerous risk factors for anxiety, including being female, married, and being a resident doctor.[23] Similarly, we found that registrars had elevated levels of depression and anxiety. Medical officers displayed the least negative psychological symptoms, which we attributed to the level of responsibility attached to their role. In contrast, a recent study in South Africa concluded that participants who were younger and had less experience had a greater prevalence of PTSD.[19]

Protective factors that were echoed in the literature included: job satisfaction, older age, and male sex.[24] An interesting phenomenon discovered to be protective in our study was that of being a parent. This finding was only significant for symptoms of stress. South African literature described that HCWs without children had a significantly higher prevalence of PTSD symptoms.[19] This highlights family support and social care as crucial factors when facing a major traumatic event such as a pandemic.

Interpersonal isolation has been cited as a cause of psychological problems and is a concern internationally.[25-27] Social seclusion and aloneness are strongly associated with depression and anxiety. Conversely, strong relationships and networks are protective against these symptoms.[28] Efforts have been made by institutions to overcome interpersonal isolation, including conference calls and debriefing sessions.[28]

Symptoms of depression, stress, and PTSD were higher in our study than in some other studies.[12,20,29,30] The reason for the lower prevalence in Singapore during the COVID-19 pandemic may be credited to increased mental preparedness. Singapore implemented infection-control measures after the SARS experience.[12] The lower levels of symptoms in other countries as described above could be attributed to the developed mental health support services as well as the easy accessibility to these services.

Depression, insomnia, anxiety, and distress of up to 71.5% were noted in China at the start of the pandemic.[31] The high prevalence was noted when the virus was a novel, global threat and there was minimal data on pathophysiology and treatment. Anxiety symptoms interfering with daily work activities were reported by 54.9% of a sample in the USA. The high prevalence of debilitating symptoms was a cause for concern.[24] The prevalence of symptoms was dependent on when data was collected, with the argument that analysing psychological health at a given point in time is flawed as it gives us insight and reflects feelings and concerns at only one point in time. Our study was conducted during the second wave of the pandemic when the pathophysiology and treatment modalities were better understood.

Importantly, almost three-quarters of participants had high-risk exposure to COVID-19 through patients they attended to. In a department that already faced high levels of psychological distress, this exposure could have exacerbated stress and mental illness. The highest ranking sources of stress were: access to appropriate PPE; being exposed to COVID-19 at work; and taking the infection home to family. The scarcity of PPE is

a sentiment that had been shared throughout the world, and subsequent concerns of fear of contagion and transmission to family and fellow HCWs were echoed.[6,16,32,33] Other studies found stigmatisation, recruitment to areas outside of normal duties, fear of salary deductions, accommodation, and interpersonal isolation as sources of stress.[23]

In our institution, being protected was ranked the most important desired organisational support to limit psychological impact, this included reducing the risk of HCWs acquiring the infection through provision of PPE and having contingency plans. This highlighted the importance of PPE and the concerns of access to PPE as echoed in a recent local study.[19] The second most desired organisational support was to be heard. To this effect, a multidisciplinary approach was implemented by the Department of Anaesthesiology's wellness committee at our institution, which included wellness meetings during the pandemic with psychologists, group counselling to anaesthetists, and psychiatric resources made available to anaesthetists. This provided participants with a platform to voice their concerns. Lai et al. describe that targeted, multidisciplinary interventions and dedicated counselling are required to help HCWs.[13]

HCWs work under difficult circumstances with unfavourable numbers of staff per patient per capita, necessitating that the system provides adequate support.[34,35] Working conditions were identified as a noticeable feature when treating patients during the pandemic.[24] Some institutions had invested in their existing mental health recovery plan and provided an initial psychological or psychiatric visit to HCWs when diagnosed with COVID-19.[24] HCWs with pre-existing mental illness needed additional support and departments needed to tailor support to their needs. Early accessibility to supporting services was cited as a requirement for a functional system.[31,33] The use of trauma signature analysis that was used in the Ebola outbreak offered guidance for directed support programs, which can be considered and modified.[36]

A recently published review stated that 61% of Canadian anaesthetists felt more stressed after the onset of the pandemic and 6% reported making a major medical error.[24] A sample from the UK reported that working at the height of the pandemic had been detrimental to their mental well-being.[24] Recommendations to improve psychological health included interventions at an individual and organisational level, namely telehealth consultations, psychological first aid, family and peer support, psycho education and involvement of institutional wellness committees.[24]

Our data is unique in that it measured all psychological components in one study. It has the potential to provide valuable information regarding the needs of HCWs, identify sources of stress and psychological needs during the pandemic, and help organisations tailor their support to optimise the mental health status of HCWs, particularly in South Africa.

Study limitations

Data was collected from 11 November 2020 until 8 April 2021 during the second wave of the pandemic in South Africa and the emotional state at that time was reflected in the data. We were unable to differentiate between pre-existing mental health symptoms and new symptoms and we did not have a baseline psychological assessment before the pandemic or after each wave. The study did not assess socio-economic status and this may be helpful for personalised treatment plans. The study was conducted online due to protocols implemented resulting in voluntary sampling and possible selection bias.

Conclusion

Our study reflected negative psychological consequences on participants as a result of the COVID-19 pandemic. Participants with a history of mental health illness were predisposed to developing negative psychological symptoms as a result of the pandemic. Sources of stress identified included insecure access to appropriate PPE, being exposed to COVID-19 at work and taking the infection home to family. Anaesthetists voiced that the organisation needed to support them by providing adequate protection.

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Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

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Supplementary table

Supplementary Table I: DASS-21 Scoring system[11]

	Depression	Anxiety	Stress
Normal	0–4	0–3	0–7
Mild	5–6	4–5	8–9
Moderate	7–10	6–7	10–12
Severe	11–13	8–9	13–16
Extremely severe	14 +	10 +	17 +