Southern African Journal of Anaesthesia and Analgesia. 2022;28(2):62-67
https://doi.org/10.36303/SAJAA.2022.28.2.2764

South Afr J Anaesth Analg
ISSN 2220-1181 85EISSN 2220-1173

ORIGINAL RESEARCH

Prevalence and predisposing factors of post-traumatic stress symptoms in anaesthetists during the second wave of COVID-19 in South Africa

T Lombard, S Spijkerman, C van Rooyen

Department of Anaesthesiology, Steve Biko Academic Hospital, University of Pretoria, South Africa
Corresponding author, email: *theodilombard@gmail.com*

Background: Post-traumatic stress symptoms (PTSS) have been described in healthcare workers after disease outbreaks. Anaesthetists are at high risk of exposure to COVID-19 due to the nature of the airway procedures they perform. Anaesthetists are also at increased risk of mental health disorders, substance abuse and suicide. When the occurrence of PTSS is great in both number and severity, these become the key elements of the diagnostic criteria for post-traumatic stress disorder (PTSD). This study explores the prevalence and predisposing factors of PTSS in anaesthetists during the second wave of COVID-19 in South Africa.

Methods: Members of the South African Society of Anaesthesiologists (SASA) completed an electronic questionnaire regarding their sociodemographic information as well as COVID-19 exposure. The PTSD checklist for DSM-5 (PCL-5) was used to measure PTSS. The resulting score gave an indication of symptom severity, with a score of 33 or higher indicating a provisional diagnosis of PTSD.

Results: A total of 483 participants completed the questionnaire (23.8% response rate). Of these, 391 participants were included in the study and 69 participants (17.6%) received a provisional PTSD diagnosis. Participants who are younger and have less experience, who are female, who are single or who do not have children exhibited a greater prevalence of PTSD. Also, those participants who had pre-existing mental health conditions ($p = 0.009$), and those who reported loneliness ($p < 0.001$) and poor social support ($p = 0.018$) were more likely to receive a provisional PTSD diagnosis. Personal protective equipment (PPE) shortages were also associated with the development of PTSD ($p = 0.009$).

Conclusion: The prevalence of PTSS is unacceptably high among South African anaesthetists, especially those with pre-existing mental health conditions and poor social support. This calls for support of vulnerable healthcare workers during disease pandemics.

Keywords: COVID-19, mental health, post-traumatic stress disorder, post-traumatic stress symptoms

Introduction

The COVID-19 pandemic has exacerbated stressors in a healthcare system where anxiety, depression and burnout had already reached epidemic proportions, with burnout as high as 84% at some healthcare institutions.[1,2] Navigating increased patient numbers in the face of limited available hospital beds, staff and personal protective equipment (PPE), may overwhelm already expended frontline workers.[3] In addition to being at risk of developing mental health problems, anaesthetists are among the highest risk for viral exposure due to their proximity to the airway and the nature of the airway procedures they perform.[4,5] Aerosol-generating procedures, such as tracheal intubation, are associated with a six-fold increased risk of transmission of acute respiratory infections.[6]

Although post-traumatic stress symptoms (PTSS) are commonly associated with military and war-related trauma, the context and definition of a 'traumatic event' is much broader and becomes relevant to the COVID-19 pandemic.[7] Literature has shown that high levels of PTSS can be found among healthcare providers resulting from an epidemic or a pandemic.[8-10] A study conducted during China's H7N9 influenza epidemic found that 20.6% of medical staff members met the symptomatic criteria for post-traumatic stress disorder (PTSD).[10] PTSS may lead to the development of PTSD, which may have dire consequences if not recognised and managed early. Individuals suffering from PTSD seldom seek help and are at two to five times greater risk of suicidal ideation and attempted suicide.[8]

COVID-19 in the South African setting raises multiple concerns when one considers the high rate of comorbidities, such as diabetes, hypertension, human immunodeficiency virus (HIV) and tuberculosis (TB). The recent African COVID-19 Critical Care Outcomes Study (ACCCOS) found that HIV, diabetes, chronic liver disease and chronic kidney disease were independently associated with mortality.[11] Rural communities and townships are also overcrowded, making social distancing nearly impossible. The situation is further complicated by poor hygiene and sanitation facilities. Another concern is the ratio of doctors and nurses per person (1 to 1 111 persons and 1 to 284 persons, respectively), which is much lower than most European countries.[12] This has placed an enormous burden on the healthcare sector to provide testing, tracing of results and medical care to COVID-19 patients, as well as continuing regular service delivery.

Mental health and physician wellness are becoming increasingly important topics in the field of anaesthesiology. Numerous studies have shown that anaesthetists are especially prone to developing anxiety, depression and burnout. They are also at increased risk of suicide and substance abuse.[13-17] A recent study conducted among South African anaesthetists found high rates of burnout, especially those working in the public sector.[18] During the COVID-19 pandemic, negative mental health outcomes such as distress, anxiety, depression and PTSS were identified in healthcare workers, as well as the general population.[8,19-28] In many cases, PTSS were severe enough to warrant a provisional diagnosis of PTSD.[19,21] A wide variety of stressors were identified among healthcare workers, either originating from an individual's workplace or their personal life. This included inadequate supply of PPE and fears of bringing infection home to family.[7] Intense media coverage, loss of income and the effect of quarantine and school closures were also identified as stressors.[29-31]

Anaesthetists may suffer emotional and occupational vulnerability during this global disaster due to their susceptibility to mental health problems and the high risk of viral exposure.[4-6] COVID-19 may exacerbate stressors and lead to the development of PTSS and subsequent PTSD. This study aimed to determine the prevalence of PTSS in anaesthetists, and to further identify predisposing factors of PTSS to develop interventions aimed at positive mental health promotion and PTSD prevention.

Methods

This was an analytical, observational, cross-sectional study of anaesthetists working at public and private hospitals in South Africa between October 2020 and January 2021. A questionnaire was sent electronically to all South African Society of Anaesthesiologists (SASA) members with known e-mail addresses via a secure web application, REDCap®. Information regarding informed consent was provided to the participants and completion of the electronic questionnaire was accepted as implied consent. Participation in this study was voluntary and anonymous.

We included medical officers, registrars, diplomate anaesthetists and specialist anaesthetists who were members of SASA at the time. Intern doctors and medical students were excluded from the study, as well as participants who completed less than 50% of the questionnaire. Participants who had experienced a recent (defined as the past year) traumatic life event, whereby the participant was exposed to actual or threatened death, serious injury or sexual violence, were also excluded from the study. This was done as symptoms may be attributable to the recent traumatic life event and not the COVID-19 pandemic.

Approval to conduct the research was obtained from the local institutional ethics committee. Contact information for SASA's Wellness in Anaesthesia Support Group was provided to each participant as they completed the questionnaire. Additional contact information for anxiety and depression, substance abuse and suicide helplines were provided.

A self-report questionnaire was used to collect sociodemographic information from participants, as well as information regarding the degree to which they were exposed to COVID-19. The PTSD checklist for DSM-5 (PCL-5) developed by Weathers et al.[32] is a 20-item self-report measure used to assess the presence and severity of PTSS in participants. The PCL-5 was initially developed for use in military service members; however, the National Center for PTSD has extrapolated its use to civilians.[32] The symptoms denoting PTSS listed on the PCL-5 correspond with the four symptom clusters of PTSD, as specified in the DSM-5. The questionnaire is designed to evaluate the four symptom clusters of PTSD, which include intrusive symptoms, avoidance symptoms, negative alteration in cognition and mood and, lastly, hyperarousal symptoms.

Participants were asked to rate how affected they had been by each symptom in the past month on a 5-point Likert scale ranging from 0–4. Symptoms were summed to provide a PTSS severity score (range = 0–80). Zero indicated that an individual did not experience any symptoms, while a score of 80 indicated maximal symptomatology. A PCL-5 score of 33 or higher was used for the provisional diagnosis of PTSD, as this was defined as a valid diagnostic cut-off score for the instrument.[32]

Statistical analysis

A proposed minimum sample size of 300 was calculated to yield a sufficiently precise estimate of the prevalence of PTSS. Frequencies and proportions with 95% confidence intervals (where appropriate) were used to describe the categorical variables. Associations between categorical variables were tested using the chi-squared test or Fisher's exact test. Univariate and multivariate logistic regression analyses were used to relate variables to PTSD diagnosis. All analyses were performed in STATA 16® (StatCorp, Texas, USA) with statistical significance at 5%. Open-ended questions were analysed through thematical analyses by two independent investigators. Differences in opinion were resolved through discussion.

Results

An electronic questionnaire was sent to 2 028 SASA members. A total of 483 participants completed the questionnaire (23.8% response rate). None of these 483 participants were intern doctors or medical students. However, 75 reported a traumatic life event in the past year and 17 completed less than 50% of the questionnaire. Therefore, only 391 participants were included in

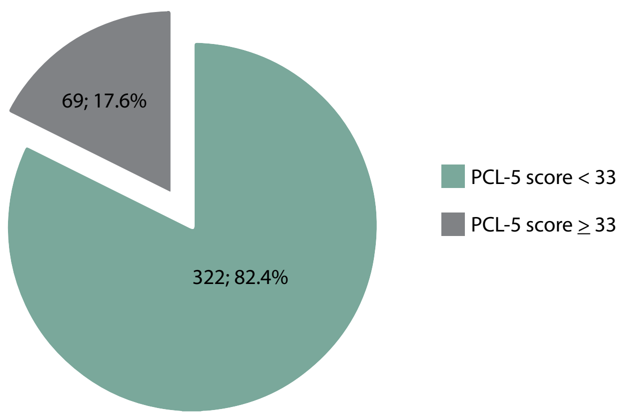

Figure 1: Prevalence of PTSD among participants

Table I: Characteristics of participants with and without PTSD

Variable	PTSD (n = 69) n (row %)	No PTSD (n = 322) n (row %)	p-value
Age			**0.011†**
< 30	1 (11.1)	8 (88.9)	
30–39	36 (25.9)	103 (74.1)	
40–49	17 (16.0)	89 (84.0)	
≥ 50	15 (10.9)	122 (89.1)	
Gender‡			**0.001†**
Male	22 (11.1)	177 (88.9)	
Female	46 (24.2)	144 (75.8)	
Marital status			**0.005†**
Single	18 (35.3)	33 (64.7)	
Married	42 (14.7)	243 (85.3)	
Cohabiting	6 (16.7)	30 (83.3)	
Divorced/widowed	3 (15.8)	16 (84.2)	
Children			**0.019†**
Yes	41 (14.8)	236 (85.2)	
No	28 (24.8)	85 (75.2)	
Geographic location‡			
Eastern Cape	5 (20.8)	19 (79.2)	
Free State	0 (0)	21 (100)	
Gauteng	33 (20.0)	132 (80.0)	
KwaZulu-Natal	10 (17.2)	48 (82.8)	
Limpopo	0 (0)	1 (100)	
Mpumalanga	0 (0)	3 (100)	
Northern Cape	0 (0)	3 (100)	
North West	1 (14.3)	6 (85.7)	
Western Cape	18 (17.5)	85 (82.5)	
Work sector			**0.111**
Public	30 (23.6)	97 (76.4)	
Private	34 (15.2)	189 (84.8)	
Both	5 (13.5)	32 (86.5)	
Hospital classification			
Private	32 (14.0)	196 (86.0)	**0.027†**
Primary	1 (33.3)	2 (66.7)	**0.474**
Secondary	2 (11.8)	15 (88.2)	**0.515**
Tertiary/central	37 (23.0)	124 (77.0)	**0.021†**
Professional rank‡			**0.141**
Medical officer	2 (33.3)	4 (66.7)	
Registrar	18 (26.1)	51 (73.9)	
Diplomate anaesthetist	4 (14.8)	23 (85.2)	
Consultant anaesthetist	44 (15.5)	240 (84.5)	
Years of anaesthetic experience‡			**0.030†**
< 5	7 (20.0)	28 (80.0)	
5–9	23 (24.5)	71 (75.5)	
10–15	17 (21.5)	62 (78.5)	
> 15	20 (11.3)	157 (88.7)	
Support structure			**< 0.001†**
Good	38 (13.0)	255 (87.0)	
Average	24 (28.9)	59 (71.1)	
Poor	7 (50.0)	7 (50.0)	
Mental health condition			**< 0.001†**
Yes	25 (34.2)	48 (65.8)	
No	44 (13.9)	272 (86.1)	
Financial stress			**0.227**
Yes	41 (20.0)	164 (80.0)	
No	28 (15.3)	155 (84.7)	
Loneliness			**< 0.001†**
Yes	61 (32.6)	126 (67.4)	
No	8 (4.0)	194 (96.0)	
Uncertainty			**0.006†**
Yes	69 (19.3)	289 (80.7)	
No	0 (0)	32 (100)	

† Statistically significant difference (p-value < 0.05)
‡ Owing to the omission of demographic data by participants, the PTSD group does not summate to sixty-nine.

the study. A total of 69 participants (17.6%; 95% CI 14.0–21.8%) obtained a score of 33 or more on the PCL-5 and received a provisional diagnosis of PTSD, as shown in Figure 1.

More male than female participants (51.2% and 48.8%, respectively) formed part of this study. Private practitioners accounted for 57.6% (n = 223) of the participants. The majority of the participants were consultant anaesthetists (n = 284, 73.6%) and 177 participants (46%) had at least 15 years of anaesthetic experience. Most participants were employed in Gauteng, Western Cape or KwaZulu-Natal provinces (42.9%, 26.7% and 15.0%, respectively).

Statistically significant differences were observed between groups of participants with PTSD and those without PTSD, as shown in Table I. Demographic factors which were found to be significant through univariate logistic regression analysis included age, gender, marital status, whether a participant had children, hospital classification and years of anaesthetic experience. Intrinsic characteristics which were associated with statistically significant differences in PTSD prevalence included social support structure, pre-existing mental health conditions and feelings of loneliness and uncertainty. Although most participants experienced financial stress, this factor was not found to be statistically significant.

Anaesthetists aged 30–39 years had a PTSD prevalence of 25.9%, whereas older anaesthetists (50 years and older) had a prevalence of 10.9%. The prevalence of PTSD among male and female participants were 11.1% and 24.2%, respectively. A multivariate logistic regression analysis revealed that female participants were 1.4 times more likely to have PTSD. However, this was not statistically significant. Married participants had a lower prevalence of PTSD than single participants (14.7% and 35.3%, respectively). Similarly, participants with children had a lower prevalence of PTSD than those without children (14.8% and 24.8%, respectively). With regards to hospital classification, the prevalence of PTSD was higher among participants who work in tertiary/central hospitals, compared to those who work in private hospitals (23.0% and 14.0%, respectively). Participants with more than 15 years' anaesthetic experience demonstrated

Table II: COVID-19 exposure of participants with and without PTSD

Variable	PTSD (*n* = 69) *n* (row %)	No PTSD (*n* = 322) *n* (row %)	*p*-value
Exposure to patients with suspected/confirmed COVID-19			**0.230**
Daily	26 (22.8)	88 (77.2)	
Weekly	29 (17.3)	139 (82.7)	
Monthly	13 (14.1)	79 (85.9)	
Never	1 (6.3)	15 (93.7)	
PPE and COVID-19 training			**0.035**§
Yes	67 (19.0)	285 (81.0)	
No	2 (5.3)	36 (94.7)	
Areas of service provision			
Non-COVID-19 theatre			**0.979**
Yes	62 (17.7)	289 (82.3)	
No	7 (17.5)	33 (82.5)	
COVID-19 theatre			**0.072**
Yes	62 (19.3)	260 (80.7)	
No	7 (10.1)	62 (89.9)	
Non-COVID-19 ICU			**0.151**
Yes	31 (21.2)	115 (78.8)	
No	38 (15.5)	207 (84.5)	
COVID-19 ICU			**0.189**
Yes	42 (20.0)	168 (80.0)	
No	27 (14.9)	154 (85.1)	
COVID-19 screening area/tent			**0.906**
Yes	3 (18.8)	13 (81.2)	
No	66 (17.6)	309 (82.4)	
COVID-19 ward			**0.945**
Yes	9 (17.3)	43 (82.7)	
No	60 (17.7)	279 (82.3)	
Emergency department			**0.602**
Yes	4 (22.2)	14 (77.8)	
No	65 (17.4)	308 (82.6)	
COVID-19 intubation team			**0.155**
Yes	38 (20.5)	147 (79.5)	
No	31 (15.0)	175 (85.0)	
PPE shortages			**< 0.001**§
Yes	45 (25.9)	129 (74.1)	
No	24 (11.1)	193 (88.9)	
Tested for COVID-19			**0.038**§
Yes	60 (19.8)	243 (80.2)	
No	9 (10.2)	79 (89.8)	
Tested POSITIVE for COVID-19			**0.847**
Yes	7 (16.7)	35 (83.3)	
No	62 (17.9)	285 (82.1)	
Close friends or relatives tested POSITIVE for COVID-19			**0.654**
Yes	53 (18.2)	239 (81.8)	
No	16 (16.2)	83 (83.8)	
Quarantined due to COVID-19 exposure or infection			**0.232**
Yes	27 (20.9)	102 (79.1)	
No	42 (16.0)	220 (84.0)	

§ Statistically significant difference (*p*-value < 0.05)
ICU – intensive care unit, PPE – personal protective equipment

the lowest prevalence of PTSD (11.3%), whereas those with 5–9 years' anaesthetic experience showed a higher prevalence of PTSD (24.5%). The prevalence of PTSD among trainees (medical officers and registrars) was 33.3% and 26.1%, respectively. This is compared to diplomate anaesthetists (14.8%) and specialist anaesthetists (15.5%). No statistically significant difference was observed between participants of various work sectors or professional rank.

As shown in Table II, most participants were exposed to patients with suspected/confirmed COVID-19 on a daily or weekly basis. However, frequency of exposure was not found to be significantly associated with PTSD prevalence. There was also no significant relationship between areas of service provision and PTSD prevalence. Of the participants, 352 (90.3%) received training regarding PPE and the management of COVID-19, whereas 38 (9.7%) did not receive training. Despite this, PTSD was more prevalent among participants who had received training, compared to those who had not received training (19.0% and 5.3%, respectively). In addition, those who had received training were five times more likely to develop PTSD. The prevalence of PTSD was higher among participants who experienced PPE shortages, compared to participants who had sufficient PPE (25.9% and 11.1%, respectively).

Of the 69 participants in the PTSD group, 60 (87%) were tested for COVID-19 and seven (10.1%) tested positive. This is in comparison to the non-PTSD group, of which 243 participants (75.5%) were tested for COVID-19 and 35 (10.9%) tested positive. Interestingly, the chi-squared test shows a significant association between a participant being tested for COVID-19 and PTSD prevalence, with no significant association between a positive test result and PTSD prevalence. With regards to participants having close friends or relatives testing positive for COVID-19 or participants being quarantined, there was no statistically significant difference in PTSD prevalence.

A multivariate logistic regression analysis was performed to evaluate predisposing factors, and the results are summarised in Table III. Logistic regression identified five predisposing factors that contributed significantly to the development of PTSD, namely pre-existing mental health condition, loneliness, poor support structure, PPE shortage and PPE training. Participants with a poor social support structure were 5.1 times more likely

Table III: Multivariate logistic regression analysis of predisposing factors of PTSD

Predisposing factor	Adjusted OR (95% CI)	*p*-value
Mental health condition	2.52 (1.26–5.07)	**0.009**¶
Loneliness	9.79 (4.16–23.05)	**< 0.001**¶
Poor support structure	5.09 (1.32–19.65)	**0.018**¶
PPE shortage	2.29 (1.22–4.30)	**0.009**¶
PPE training	5.03 (1.05–24.03)	**0.043**¶

¶ Statistically significant difference (*p*-value < 0.05)
OR – odds ratio, CI – confidence interval, PPE – personal protective equipment

to develop PTSD and those who experienced loneliness were 9.8 times more likely to be diagnosed with PTSD.

Participants with pre-existing mental health conditions demonstrated a higher prevalence of PTSD compared to those not previously diagnosed with a mental health condition (34.2% and 13.9%, respectively). The adjusted odds ratio (OR) demonstrates that participants were 2.5 times more likely to develop PTSD.

In response to an open-ended question included in the questionnaire, various other stressful factors were reported by participants. It was observed that feelings of uncertainty, academic stress and financial strain were experienced by many participants. Numerous participants reported that separation from family and isolation were traumatic for them. Fear for one's own life and health, as well as the illness or loss of loved ones or colleagues during the COVID-19 pandemic were common stressors among participants. A few participants reported positive experiences during the COVID-19 pandemic. Some participants experienced the reduction in workload and nationwide 'lockdown' as enjoyable, citing that they were 'probably overworked'. Another respondent felt that working during the pandemic had a positive effect on them, mentioning that 'strangely enough, work has kept me going'.

Discussion

In this observational, cross-sectional study of 391 participants, we investigated the prevalence and predisposing factors of PTSS among anaesthetists during the second wave of the COVID-19 pandemic in South Africa. To our knowledge, this is the first study of its kind in South Africa. It was shown that a provisional PTSD diagnosis had a prevalence of 17.6%. While various demographic factors, intrinsic characteristics and COVID-19 exposure factors were associated with PTSD, only a few were strongly associated with the development of PTSD through multivariate logistic regression analyses. These factors included pre-existing mental health condition, poor social support structure, feelings of loneliness, and PPE shortage and training.

Although our study focussed on anaesthetists specifically, several recent studies have investigated the prevalence of PTSD in healthcare workers during the COVID-19 pandemic. Two studies conducted among healthcare personnel in Spain and China reported PTSS in 56.6% and 40.2% of respondents, respectively.[27,33] A large Chinese study including nearly 15 000 emergency department personnel, found that symptoms of depression were more common than PTSD (25.2% and 9.1%, respectively).[21] The prevalence of PTSD in our study was similar to the findings of two other studies conducted among nurses and frontline workers.[19,22] The variance in prevalence may be explained by factors such as geographical differences in the COVID-19 peak periods and durations of outbreaks. Infrastructure and resource disparities between healthcare systems, as well as the psychological reaction of healthcare professionals may differ during an outbreak of an infectious disease. Healthcare workers in Singapore demonstrated an almost three times higher prevalence of PTSD during the SARS outbreak, compared to COVID-19. This could be attributed to improved mental preparedness and infection control measures.[23] Variation in occupational exposure levels of healthcare workers and the fact that a range of PTSD screening tools were used, may also have contributed to the differences in PTSD prevalence.

According to our findings, several demographic variables were associated with PTSD. Female gender was positively correlated with PTSD. Although this was only shown to be significant through univariate analysis, this finding is consistent with multiple other publications.[19,25,26,28] PTSD was less prevalent among anaesthetists in the private sector, which is interesting considering the financial losses and stress they may have experienced during the pandemic. Anaesthetists with more years of anaesthetic experience had a lower prevalence of PTSD. Furthermore, PTSD was almost twice as prevalent among trainees (medical officers and registrars) compared to the diplomate and specialist anaesthetist groups. This may suggest that professional maturity and clinical experience may be conducive to improved coping abilities when faced with a pandemic such as COVID-19. Likewise, several recent studies found that younger medical professionals with less work experience suffered higher levels of adverse psychological outcomes during the COVID-19 pandemic.[19,21,22,25,26,28]

It has been shown in our study that loneliness and poor social support structures were strongly associated with PTSD, a finding consistent with numerous previous studies.[21,25-27] Our study also found that PTSD was more prevalent among unmarried participants, as well as those without children. Although this was only shown to be statistically significant through univariate analyses, publications by Song et al.[21] and González Ramírez et al.[26] had similar findings. These observations highlight the importance of family and social support for medical personnel to maintain psychological health.

The association between pre-existing mental health conditions and the development of various adverse psychological outcomes (such as depression, anxiety, burnout and PTSD) has been widely researched among healthcare workers. Our findings are consistent with the literature as it showed a strong association between an individual's pre-existing mental health condition and PTSD.[22] This reiterates the vulnerability of this specific group of healthcare providers to the development of PTSD during the COVID-19 pandemic.

Our study found an association between PPE shortages and PTSD, with those who experienced shortages being more than twice as likely to develop PTSD. Interestingly, anaesthetists who had received training on PPE and the management of COVID-19 experienced a higher prevalence of PTSD. This association, which was significant through multivariate analysis, may highlight a potential adverse psychological impact of training. Although ongoing training in the medical profession is crucial, it may also provoke uncertainty and fear, especially during a novel global pandemic such as COVID-19. This emphasises the need for wellorganised, informative and empowering training programmes for healthcare workers during infectious disease outbreaks.

The various stressors that were reported in response to an open-ended question in the questionnaire, provided insight into the specific concerns and emotions experienced by anaesthetists during the COVID-19 pandemic. Although this information did not form part of our primary aims and objectives, it is necessary to emphasise the wide spectrum of selective stressors and the impact it may have had on participants' mental health and overall wellbeing.

A major strength of this study was its study size. Good participation was observed from both public and private sector anaesthetists. Additionally, this was a multicentre study which included participants from all hospital sectors and provinces in South Africa.

This study does, however, have several limitations. It is a cross-sectional study that does not enable us to determine causality of psychological outcomes. Also, it must be noted that there is a dynamic interplay between trauma exposure and symptomatology. As the COVID-19 pandemic changes, the mental health of medical professionals may also change. We neither assessed the prevalence of PTSD symptoms prior to the COVID-19 pandemic, nor followed the progression or improvement of symptoms. Furthermore, data collection for this study occurred during the second peak of COVID-19 infections in South Africa. At the time of writing, a third wave of infections was underway. Repeated exposure to trauma may increase the susceptibility of an individual to developing PTSD; thus, the prevalence of PTSD among medical professionals may increase as the COVID-19 pandemic continues. Alternatively, the prevalence of PTSD may decrease across the COVID-19 pandemic trajectory, as healthcare systems improve infection control measures and resource allocation. Healthcare providers may become more familiar with protocols and experience increased mental preparedness, as the unknown becomes more familiar. Another limitation of the study is that although the prevalence of PTSD was measured, other outcomes of a traumatic event such as depression, anxiety and substance abuse were not measured. Hence, the emotional impact of COVID-19 might have been underestimated. Other potentially significant associated factors for PTSD were not fully discussed in the current study, such as life stress, coping styles and personality, which may have had potential confounding effects on PTSD. The study was also limited by the fact that the PCL-5 is only a screening tool used for diagnosing provisional PTSD and a definitive diagnosis of PTSD cannot be made exclusively based on the results of the PCL-5 questionnaire. In addition, the PCL-5 was originally designed for use by military personnel, which highlights the need for the development of a unique measuring tool that could be validated and standardised for use by healthcare workers. This may be an area for future research involving a multidisciplinary platform which may include, among others, doctors, nursing staff and psychologists.

The questionnaire was self-administered, which may introduce inherent bias. Owing to the sensitive nature of the questionnaire, respondents may have been reluctant to participate in the study, or perhaps they were too 'burned out' to participate. On the other hand, participants with greater mental health concerns may have been more likely to respond, in comparison to those who did not feel personally affected. Lastly, all participants in the current study are anaesthetists. Owing to the diverse working environments and experience of various healthcare professionals during the COVID-19 pandemic, the generalisability of these results to other medical disciplines remains to be verified.

Conclusion

The mental health impact of the COVID-19 pandemic, especially among emotionally and occupationally vulnerable disciplines, may have devastating consequences on healthcare workers, communities and institutions. Findings from this study indicate the importance of supporting susceptible healthcare workers through interventions aimed at positive mental health promotion and PTSD prevention. Learning from our experiences during this pandemic may help guide our mental healthcare response to future outbreaks.

Acknowledgements

This work was supported by the South African Society of Anaesthesiologists (SASA). We would like to thank all the anaesthetists who participated in the study.

Conflict of interest

The authors declare no conflict of interest.

Funding source

No funding was required.

Ethical approval

Ethical approval was granted by the University of Pretoria Faculty of Health Sciences Research Ethics Committee (705/2020).

ORCID

T Lombard https://orcid.org/0000-0001-6748-1687
S Spijkerman https://orcid.org/0000-0003-4461-3370
C van Rooyen https://orcid.org/0000-0002-4817-0194

References

1. Van der Walt N, Scribante J, Perrie H. Burnout among anaesthetists in South Africa. South Afr J Anaesth Analg. 2015;21(6):169-72. https://doi.org/10.1080/22201181.2015.1102798.
2. Zeijlemaker C, Moosa S. The prevalence of burnout among registrars in the School of Clinical Medicine at the University of the Witwatersrand, Johannesburg, South Africa. S Afr Med J. 2019;109(9):668-72. https://doi.org/10.7196/SAMJ.2019.v109i9.13667.
3. Roux CL, Dramowski A. Personal protective equipment (PPE) in a pandemic: Approaches to PPE preservation for South African healthcare facilities. S Afr Med J. 2020;110(6):468-8. https://doi.org/10.7196/SAMJ.2020.v110i6.14831.
4. Cook TM, El-Boghdadly K, McGuire B, et al. Consensus guidelines for managing the airway in patients with COVID-19: Guidelines from the Difficult Airway Society, the Association of Anaesthetists the Intensive Care Society, the Faculty of Intensive Care Medicine and the Royal College of Anaesthetists. Anaesthesia. 2020;75(6):785-99. https://doi.org/10.1111/anae.15054.
5. Preckel B, Hulst AH, Hermanides J, et al. Update for anaesthetists on clinical features of COVID-19 patients and relevant management. J Clin Med. 2020;9(5):1495. https://doi.org/10.3390/jcm9051495.
6. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare

workers: a systematic review. PloS ONE. 2012;7(4):e35797. https://doi.org/10.1371/journal.pone.0035797.

7. Restauri N, Sheridan A. Burnout and post-traumatic stress disorder in the Coronavirus disease 2019 (COVID-19) pandemic: Intersection, impact, and interventions. J Am Coll Radiol. 2020;17(7):921-6. https://doi.org/10.1016/j.jacr.2020.05.021.
8. Dutheil F, Mondillon L, Navel V. PTSD as the second tsunami of the SARS-Cov-2 pandemic. Psychol Med. 2021;51(10):1773-4. https://doi.org/10.1017/S0033291720001336.
9. Levin J. Mental health care for survivors and healthcare workers in the aftermath of an outbreak. In: Huremović D, editor. Psychiatry of pandemics: A mental health response to infection outbreak. Switzerland: Springer; 2019. p. 127-41. https://doi.org/10.1007/978-3-030-15346-5_11.
10. Tang L, Pan L, Yuan L, Zha L. Prevalence and related factors of post-traumatic stress disorder among medical staff members exposed to H7N9 patients. Int J Nurs Sci. 2017;4(1):63-7. https://doi.org/10.1016/j.ijnss.2016.12.002.
11. African COVID-19 Critical Care Outcomes Study (ACCCOS) Investigators. Patient care and clinical outcomes for patients with COVID-19 infection admitted to African high-care or intensive care units (ACCCOS): a multicentre, prospective, observational cohort study. Lancet. 2021;397(10288):1885-94. https://doi.org/10.1016/s0140-6736(21)00441-4.
12. Zamparini J, Venturas J, Diana N. COVID-19 and the uniqueness of South Africa. S Afr J Infect Dis. 2020;35(1):a208. https://doi.org/10.4102/sajid.v35i1.208.
13. Van der Westhuizen JL, Roodt F, Nejthardt M, et al. The prevalence of substance use in anaesthesia practitioners in South Africa. South Afr J Anaesth Analg. 2019;25(6):14-20. https://doi.org/10.36303/SAJAA.2019.25.6.A2.
14. Nyssen AS, Hansez I. Stress and burnout in anaesthesia. Curr Opin Anaesthesiol. 2008;21(3):406-11. https://doi.org/10.1097/ACO.0b013e3282ff85cd.
15. McDonnell NJ, Kaye RM, Hood S, Shrivastava P, Khursandi DC. Mental health and welfare in Australian anaesthetists. Anaesth Intensive Care. 2013;41(5):641-7. https://doi.org/10.1177/0310057X1304100510.
16. Lapa TA, Carvalho SA, Viana JS, Ferreira PL, Pinto-Gouveia J. Stressors in anaesthesiology: development and validation of a new questionnaire: A cross-sectional study of Portuguese anaesthesiologists. Eur J Anaesthesiol. 2016;33(11):807-15. https://doi.org/10.1097/EJA.0000000000000518.
17. Van der Wal RA, Bucx MJ, Hendriks JC, Scheffer GJ, Prins JB. Psychological distress, burnout and personality traits in Dutch anaesthesiologists: A survey. Eur J Anaesthesiol. 2016;33(3):179-86. https://doi.org/10.1097/EJA.0000000000000375.
18. Coetzee JF, Kluyts H. Burnout and areas of work-life among anaesthetists in South Africa. Part 1: Burnout. South Afr J Anaesth Analg. 2020;20(2):73-82. https://doi.org/10.36303/SAJAA.2020.26.2.2358.
19. Wang YX, Guo HT, Du XW, et al. Factors associated with post-traumatic stress disorder of nurses exposed to corona virus disease 2019 in China. Medicine. 2020;99(26):e20965. https://doi.org/10.1097/MD.0000000000020965.
20. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. Brain Behav Immun. 2020;89:531-42. https://doi.org/10.1016/j.bbi.2020.05.048.
21. Song X, Fu W, Liu X, et al. Mental health status of medical staff in emergency departments during the Coronavirus disease 2019 epidemic in China. Brain Behav Immun. 2020;88:60-5. https://doi.org/10.1016/j.bbi.2020.06.002.
22. Miguel-Puga JA, Cooper-Bribiesca D, Avelar-Garnica FJ, et al. Burnout, depersonalization, and anxiety contribute to post-traumatic stress in frontline health workers at COVID-19 patient care, a follow-up study. Brain Behav. 2021;11(3):e02007. https://doi.org/10.1002/brb3.2007.
23. Tan BYQ, Chew NWS, Lee GKH, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. Ann Intern Med. 2020;173(4):317-20. https://doi.org/10.7326/M20-1083.
24. Chew NWS, Ngiam JN, Tan BY, et al. Asian-Pacific perspective on the psychological well-being of healthcare workers during the evolution of the COVID-19 pandemic. BJPsych Open. 2020;6(6):e116. https://doi.org/10.1192/bjo.2020.98.
25. González-Sanguino C, Ausín B, Castellanos M, et al. Mental health consequences during the initial stage of the 2020 Coronavirus pandemic (COVID-19) in Spain. Brain Behav Immun. 2020;87:172-6. https://doi.org/10.1016/j.bbi.2020.05.040.
26. González Ramírez LP, Martínez Arriaga RJ, Hernández-Gonzalez MA, De la Roca-Chiapas JM. Psychological distress and signs of post-traumatic stress in response to the COVID-19 health emergency in a Mexican sample. Psychol Res Behav Manag. 2020;13:589-97. https://doi.org/10.2147/PRBM.S259563.
27. Si MY, Su XY, Jiang Y, et al. Psychological impact of COVID-19 on medical care workers in China. Infect Dis Poverty. 2020;9(1):113. https://doi.org/10.1186/s40249-020-00724-0.
28. Caillet A, Coste C, Sanchez R, Allaouchiche B. Psychological impact of COVID-19 on ICU caregivers. Anaesth Crit Care Pain Med. 2020;39(6):717-22. https://doi.org/10.1016/j.accpm.2020.08.006.
29. Yin Q, Sun Z, Liu T, et al. Post-traumatic stress symptoms of health care workers during the corona virus disease 2019. Clin Psychol Psychother. 2020;27(3):384-95. https://doi.org/10.1002/cpp.2477.
30. Assari S, Habibzadeh P. The COVID-19 emergency response should include a mental health component. Arch Iran Med. 2020;23(4):281-2. https://doi.org/10.34172/aim.2020.12.
31. Hawryluck L, Gold WL, Robinson S, et al. SARS control and psychological effects of quarantine, Toronto, Canada. Emerg Infect Dis. 2004;10(7):1206-12. https://doi.org/10.3201/eid1007.030703.
32. Weathers F, Litz B, Keane T, et al. The PTSD Checklist for DSM-5 (PCL-5) [Internet]. 2013. Available at: https://www.ptsd.va.gov.
33. Luceño-Moreno L, Talavera-Velasco B, García-Albuerne Y, Martín-García J. Symptoms of post-traumatic stress, anxiety, depression, levels of resilience and burnout in Spanish health personnel during the COVID-19 pandemic. Int J Environ Res Public Health. 2020;17(15):5514. https://doi.org/10.3390/ijerph17155514.