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Psychological Health of Surgeons in a Time of COVID-19

A Global Survey

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Objective: To assess the degree of psychological impact among surgical providers during the COVID-19 pandemic.

Summary of Background Data: The COVID-19 pandemic has extensively impacted global healthcare systems. We hypothesized that the degree of psychological impact would be higher for surgical providers deployed for COVID-19 work than for those who knew of someone diagnosed with, or who died, of COVID-19.

Methods: We conducted a global web-based survey to investigate the psychological impact of COVID-19. The primary outcomes were the depression anxiety stress scale-21 and Impact of Event Scale-Revised scores.

Results: A total of 4283 participants from 101 countries responded. 32.8%, 30.8%, 25.9%, and 24.0% screened positive for depression, anxiety, stress, and PTSD respectively. Respondents who knew someone who died of COVID-19 were more likely to screen positive for depression, anxiety, stress, and PTSD (OR 1.3, 1.6, 1.4, 1.7 respectively, all P < 0.05). Respondents who knew of someone diagnosed with COVID-19 were more likely to screen positive for depression, stress, and PTSD (OR 1.2, 1.2, and 1.3 respectively, all P < 0.05). Surgical specialties that operated in the head and neck region had higher psychological distress among its surgeons. Deployment for COVID-19-related work was not associated with increased psychological distress.

Conclusions: The COVID-19 pandemic may have a mental health legacy outlasting its course. The long-term impact of this ongoing traumatic event underscores the importance of longitudinal mental health care for healthcare personnel, with particular attention to those who know of someone diagnosed with, or who died of COVID-19.

Keywords: anxiety, COVID-19, depression, pandemic, post-traumatic stress disorder, psychological health, stress

Methods

Overview

We conducted a web-based survey to investigate the psychological impact of COVID-19 on surgical staff. This study was approved by the National Healthcare Group Domain Specific Review Board, Singapore (Reference No. 2020/00782) and the Survey and Behavioural Research Ethics Committee of the Chinese University of Hong Kong (Reference No. SBRE-19-721).
Content Development

The content of the survey was developed using a modified Delphi method. The first draft of the questionnaire was developed by the steering committee (YQT, JM, JYCT, EC) after reviewing the current literature regarding the psychological impact of COVID-19. The questionnaire was sent out to the #SoMe4Surgery working group. The questions were further refined by the steering committee until consensus was reached. The final questionnaire, available in English only, comprised 66 items, covering demographics (9 questions), the impact of the COVID-19 pandemic (14 questions), the depression, anxiety, and stress scale (DASS-21) (21 questions), and the impact of events scale-revised (IES-R) (22 questions).

Data Collection

The survey was primarily distributed via the #SoMe4Surgery Twitter platforms, a large social network with multiple branches. Other organizations also disseminated the survey either via their Twitter accounts or mailing lists. Details on the survey dissemination are summarized in Table S1, http://links.lww.com/SLA/C943. All data were only accessible by completing the survey once. Responses were collected via the SurveyMonkey website and all data were only accessible by study investigators. The number of COVID-19 cases of each country was obtained from the European Centre for Disease Prevention and Control.

Data Synthesis and Analysis

The primary outcomes were the DASS-21 and IES-R scores. For the DASS-21, cut-off scores of >9, >7, and >14 represent a positive screen of depression, anxiety, and stress respectively. Depression, anxiety, stress subscale scores, and IES-R scores were categorized as mild to extremely severe as per standard score ranges. All statistical analyses were performed using SPSS for Windows version 26.0 (SPSS Inc, Chicago, IL) and heatmaps were constructed using Tableau 2020.2 (QVY, YHC). To determine the reliability and internal validity of questionnaire, Cronbach alpha, and confirmatory factor analysis were used. Heat maps for the DASS-21 and IES-R scores were created to analyze the global psychological impact by geographical location. Predictors for screening positive for depression, anxiety, stress, and PTSD were assessed using logistic regression. Statistical significance was set at 2-sided P < 0.05.

RESULTS

Between 15 and 30 June 2020, a total of 4283 participants from 101 countries responded (Table S2, http://links.lww.com/SLA/C943 in Supplementary Appendix, http://links.lww.com/SLA/C943). Of which, 3391 participants completed the whole survey, with an overall complete response rate of 79.2%. The mean time required to complete the survey was 8 minutes. The depression, anxiety, stress subscales, and IES-R score presented a high internal consistency, with Cronbach alpha 0.903, 0.859, 0.894, and 0.962, respectively, and had a high level of validity with comparative FIT index of 0.969, 0.966, 0.978, and 0.907, respectively.

Demographic Data

Demographic data were summarized in Table S3, http://links.lww.com/SLA/C943. Of which, 3391 respondents were male. The highest number of respondents were from Asia, followed by Europe, Africa, South America, North America, and Australia/New Zealand. Six in 10 respondents worked in teaching hospitals and academic institutions. 60.2% of respondents were of at least consultant/attending surgeon level and above. 34.1% were trainees/residents, and 5.8% were surgical nurse specialists. Classified by specialty, the top 3 specialties by participants were general surgery (45.8%), urology (22.9%), and trauma and orthopedic surgery (6.3%).

Geographical Variation of DASS-21 and IES-R Scores

Overall, higher DASS-21 scores were seen Europe, Asia, North America, and South America, compared to Africa and Australia/New Zealand. Figure 1 shows a global heat map of the mean total DASS-21 score. IES-R scores were higher in Europe, North America, and South America, compared to Asia, Africa, and Australia/New Zealand. Figure 2 shows a global heat map of the mean IES-R score.

Psychological Impact of the COVID-19 Pandemic

The psychological impact of the COVID-19 pandemic on respondents is summarized in Table S4, http://links.lww.com/SLA/C943. Of which, 3391 respondents had personal diagnoses of COVID-19. 8.6% (293) had family members diagnosed with COVID-19, and 4.5% (151) had family members who died from COVID-19. 58.7% of respondents had colleagues or friends who were diagnosed with COVID-19, and 27.7% had colleagues or friends who died from COVID-19. One in 5 respondents cared for patients who died from COVID-19. Majority of respondents were deployed to care for COVID-19 patients. 24.8% and 58.8% of participants were deployed on a mandatory and voluntary basis respectively. Before this pandemic, 3.2%, 5.0%, and 3.2% of respondents had been previously diagnosed with depression, anxiety, and stress respectively. Since the COVID-19 Pandemic, an additional 1.6%, 4.3%, and 3.8% of respondents were newly diagnosed with depression, anxiety, and stress respectively. Overall, only 6.9% of respondents reported seeking psychological help. 37.4% of respondents reported having experienced insomnia since the start of the pandemic. 30.5% of respondents reported readily available mental health facilities at their workplaces, with the other half either reporting unavailability or difficulty accessing mental help. Nearly half (48.6%) of respondents did not discuss mental health issues with others. Since the start of this pandemic, only 31.5% of respondents had taken vacation leave. The most commonly reported coping mechanisms for work stress were spending time with family/friends (66.9%), watching television (66.8%), and social media (56.5%).

DASS-21 and IES-R Scores

The overall DASS-21 and IES-R scores by severity are summarized in Table 1. 32.8%, 30.8%, and 25.9% of respondents screened positive for depression, anxiety, and stress. 24.0% of respondents screened positive for PTSD.

Figures S1 to S4, http://links.lww.com/SLA/C943 in Supplementary Appendix, http://links.lww.com/SLA/C943 summarizes the specialties with the highest proportion of respondents screening positive for psychological health conditions. For depression, cardiothoracic surgery had the highest proportion of respondents screening positive (38.1%), followed by pediatric surgery (36.1%), and general surgery (35.3%). For anxiety, data were summarized in Table 2, http://links.lww.com/SLA/C943, and 4.5% had family members who died from COVID-19.
cardiothoracic surgery also had the highest proportion of respondents screening positive (39.3%), followed by vascular surgery (39.0%) and neurosurgery (38.3%). For stress, ophthalmology had the highest proportion of respondents screening positive (34.6%), followed by neurosurgery (33.3%) and cardiothoracic surgery (32.1%). For PTSD, ophthalmology had the highest proportion of respondents screening positive (34.6%), followed by cardiothoracic surgery and neurosurgery (both 33.3%).

**Multivariate Analysis of Predictive Factors for Psychological Health Conditions**

Detailed tables of the multivariate analysis for the predictive factors for a positive screen for psychological conditions can be found in Tables S5 to S8, http://links.lww.com/SLA/C943 in the Supplementary Appendix, http://links.lww.com/SLA/C943.

On multivariate analysis for the predictive factors for depression, females were 1.3 times as likely as males to screen positive for depression (95% CI: 1.1–1.5, \( P = 0.003 \)). Younger respondents were more likely to screen positive than older respondents (OR 3.2, 95% CI 1.6–6.1, \( P = 0.001 \); OR 2.8, 95% CI 1.5–5.1, \( P = 0.001 \); OR 2.7, 95% CI 1.5–4.6, \( P = 0.001 \) and OR 1.7, 95% CI 1.0–2.7, \( P = 0.032 \) for age 21–29, 30–39, 40–49, and 50–59, respectively). Respondents who knew someone diagnosed with COVID-19 were more likely to screen positive for depression, OR 1.2 (95% CI: 1.01–1.4, \( P = 0.045 \)). Those who knew someone who died of COVID-19 were also significantly more likely to screen positive for depression (OR 1.3, 95% CI 1.1–1.6, \( P = 0.001 \)). There were no statistically significant differences in depression rates when comparing location of clinical practice, type of hospital, specialty, occupation, and deployment status.

On multivariate analysis for the predictive factors for anxiety, females were 1.4 times as likely as males to screen positive for anxiety (95% CI: 1.2–1.6, \( P < 0.001 \)). Respondents with less years of practice were more likely to screen positive than those with more than 20 years of practice). Respondents who knew someone who died of COVID-19 were more likely to screen positive for anxiety, OR 1.6 (95% CI: 1.3–1.9, \( P < 0.001 \)). There were no statistically significant differences in depression rates when comparing location of clinical practice, type of hospital, specialty, occupation, deployment status, and knowing someone diagnosed with COVID-19.

On multivariate analysis for the predictive factors for stress, females were 1.6 times as likely as males to screen positive for stress (95% CI: 1.3–1.9, \( P < 0.001 \)). Younger respondents were more likely to screen positive than older respondents (OR 3.4, 95% CI 1.6–7.1, \( P = 0.001 \); OR 2.9, 95% CI 1.5–5.7, \( P = 0.002 \); OR 2.9, 95% CI 1.6–5.4, \( P = 0.001 \) and OR 2.2, 95% CI 1.3–3.9, \( P = 0.005 \) for age 21–29, 30–39, 40–49, and 50–59, respectively). Respondents who knew someone diagnosed with COVID-19 were more likely to screen positive for stress (OR 1.2 95% CI: 1.0–1.5, \( P = 0.034 \)). Those who knew someone who died of COVID-19 were also more likely to screen positive for stress (OR 1.4, 95% CI: 1.2–1.7, \( P < 0.001 \)). There were no

![FIGURE 1. Global heat map of the mean DASS-21 score.](image-url)
statistically significant differences in depression rates when comparing location of clinical practice, type of hospital, specialty, occupation, and deployment status.

On multivariate analysis for the predictive factors for PTSD, females were 1.6 times as likely as males to screen positive for PTSD (95% CI: 1.3-1.9, \( P < 0.001 \)). Respondents with less years of practice were more likely to screen positive than those with more than 20 years of practice (OR 2.8, 95% CI 1.7–4.6, \( P < 0.001 \); OR 2.7, 95% CI 1.7–4.3, \( P < 0.001 \); OR 2.0, 95% CI 1.3–3.1, \( P = 0.004 \) and OR 1.8, 95% CI 1.2–2.7, \( P = 0.009 \) for <5 years, 6–10 years, 11–15 years, and 16–20 years, respectively). Respondents who knew someone diagnosed with COVID-19 were more likely to screen positive for PTSD (OR 1.3, 95% CI 1.0–1.5, \( P = 0.03 \)). Those who knew someone who died of COVID-19 were also more likely to screen positive for PTSD (OR 1.7, 95% CI 1.4–2.0, \( P < 0.001 \)). There were no statistically significant differences in depression rates when comparing location of clinical practice, type of hospital, specialty, occupation, and deployment status.

**DISCUSSION**

The recent tragedies of Drs Lorna Breen and Yelena Nepomnyashchaya have cast a spotlight on mental health issues amongst doctors battling COVID-19 on the frontlines. Moral injury, described by Litz et al,\(^1\) refers to the deleterious impact on military personnel when they fail to prevent, or simply watch, things that go against their sense of morality and identity. The lack of manpower, PPE, and social support may have culminated moral injury, resulting in the premature death of young promising lives. Medical health professionals have a higher suicide rate compared to that of the general public,\(^1\) and they are

| Severity     | Depression (%) | Anxiety (%) | Stress (%) | PTSD (%) |
|--------------|----------------|-------------|------------|----------|
| Normal       | 2279 (67.2)    | 2348 (69.2) | 2512 (74.1) | 2578 (76.0) |
| Mild         | 337 (9.9)      | 188 (5.5)   | 310 (9.1)  | 350 (10.3)  |
| Moderate     | 451 (13.3)     | 427 (12.6)  | 287 (8.5)  | 90 (2.7)   |
| Severe       | 177 (5.2)      | 183 (5.4)   | 215 (6.3)  | 373 (11.0)  |
| Extremely severe | 147 (4.3)     | 245 (7.2)   | 67 (2.0)   | N.A.       |

DASS-21 indicates depression anxiety stress scale-21; IES-R, impact of event scale-revised; PTSD, post-traumatic stress disorder.
at an even more vulnerable position in the time of this pandemic. The pandemic unearthed casualties on a scale rarely seen in recent times. It is estimated that within the United States, the deaths from COVID-19 has surpassed the deaths from armed conflict in recent times. The resolution of the World Health Assembly in 2005 estimated that 10% of the people who experience war-related traumatic events will have serious mental health problems and another 10% will develop behavior that will hinder their ability to function effectively.

This is the first global psychological health survey of surgical providers during this pandemic, with a vigorous complete response rate of 79.2%. Our study revealed demographics that may be at greater risk of depression, anxiety, stress, and PTSD. These included female sex, younger age, fewer years of clinical practice, and closer proximity to known COVID-19 cases. Interestingly, specialties which seemed the most affected involved those who operate in the head and neck and thorax region (neurosurgery, ophthalmology, and cardiothoracic surgery). Notably, otorhinolaryngology did not follow this trend. This may be due to a multitude of reasons, such as better baseline preparation for airway precautions and management, support, and dedicated PPE for this specialty which may be deemed at high risk of exposure to respiratory aerosol.

There is an impetus to identify those at risk of developing psychological morbidities and provide assistance. The DASS-21 is a screening tool and not a categorical measure of clinical diagnoses. There is a demonstrated discrepancy between those who screened positive versus those who obtained formal diagnoses. Approximately 25%–33% screened positive for depression, anxiety, and stress on DASS-21 but only 6.9% sought psychological help. 4% were formally diagnosed since the pandemic started. Under-utilisation of mental health care facilities has also similarly been established in other settings, such as spousal abuse victims and asylum seekers. Despite being healthcare providers, less than half of the survey respondents reported readily available and accessible mental health facilities at their workplaces. With resources diverted to address the physical toll of this pandemic, it is often easy to overlook the detrimental effects the pandemic has on mental health.

Our study also found that age was a protective factor when screening for psychological health conditions. There may be a multitude of reasons for this, such as younger doctors having higher workload, and increased uncertainty about training and disruptions to career progression due to COVID-19. The Apprenticeship Model\textsuperscript{27,28} has been a long-adopted system for surgical training. This model may also lend structure to the psychological support system for the younger surgical trainees. A cultural change is also overdue to address negative perceptions of seeking help amongst both colleagues and seniors. The COVID-19 pandemic may have a mental health legacy outlasting its course. The experience and emotional resilience of older surgical providers may provide part of the answer to this burgeoning emergence of symptoms following traumatic stress exposure.

Our study demonstrated that having family or friends diagnosed with, or dying from, COVID-19, contributed significantly to increased risks of psychological morbidity. Actively seeking out these factors in the risk stratification of healthcare workers may help to refine the approach to improving mental health as a whole. In addition, interventions to reduce the stigma of seeking help and improving access to counselors and online mental health resources (eg, online mindfulness-based therapy) should be implemented. These would include the provision of psychologically safe spaces, education of self-care strategies, and management of emotions.

There were various limitations of this study. A majority of respondents were from Europe and Asia. The under-representation from the United States of America may have resulted in an underestimate of the psychological health conditions, especially since the USA currently accounts for the highest number of COVID-19 cases and deaths worldwide. Doctors who might have been truly preoccupied with the COVID-19 response might not have had the opportunity to respond to this survey. Comparisons of mental stress incidence between individual countries was not performed due to nonuniform distribution of responses between countries. In addition, it must be recognized that apart from the demographic factors that were included, there would be other variables which could have influenced mental health that were difficult to quantify within the limits of a survey, for example, family support, social support, and cultural differences among countries. Moreover, we recognize that mental illness-related stigma exists among healthcare providers, forming a barrier for access of psychological help. This stigma may result in a reporting bias. We attempted to minimize this by ensuring strict anonymity of the survey. This survey tool was only available in English; hence it might have limited responses from certain non-English literate countries.

In summary, surgical personnel demonstrated noteworthy levels of psychological trauma. Our findings suggest that being versed in the care of COVID-19 patients does not render one immune to the stresses of battling the disease on the frontline. The potential long-drawn-out nature of the war against COVID-19 may also exacerbate the development of psychological disorders. The longterm impact of this ongoing traumatic event underscores the importance of longitudinal mental health care for healthcare personnel, with particular attention to those who know of someone diagnosed with, or who died of COVID-19.

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REFERENCES
1. Teoh JY, Ong WLK, Gonzalez-Padilla D, et al. A global survey on the impact of COVID-19 on urological services. Eur Urol. 2020;78:265–275.
2. Ong WLK, Lehmannandan S, Loeb S, et al. Urologic services in public hospitals suffered a greater detriment than private hospitals during the battle of COVID-19. Urology. 2020;144:269–270.
3. Chan SM, Ma TW, Ka-Chun Chong M, et al. A proof of concept study: esophagagogastroduodenoscopy is an aerosol-generating procedure and continuous oral suction during the procedure reduces the amount of aerosol generated. Gastroenterology. 2020;159:1949–1951.e4.
4. de Leeuw RA, Burger NB, Ceccononi M, et al. COVID-19 and laparoscopic surgery: scoping review of current literature and local expertise. JMRI Public Health Surg. 2020;6:e18928.
5. Nguyen LH, Drew DA, Graham MS, et al. Risk of COVID-19 among frontline health-care workers and the general community: a prospective cohort study. Lancet Public Health. 2020;5:e475–e483.
6. Yang MC, Hung PP, Wu YK, et al. A three-generation family cluster with COVID-19 infection: should quarantine be prolonged? Public Health. 2020;185:31–33.
7. 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;173:317–320.
8. Temsah MH, Al-Solhime F, Alamro N, et al. The psychological impact of COVID-19 pandemic on health care workers in a MERS-CoV endemic country. J Infect Public Health. 2020;13:877–882.
9. Normand SL, McNeil BJ, Peterson LE, et al. Eliciting expert opinion using the Delphi technique: identifying performance indicators for cardiovascular disease. Int J Qual Health Care. 1998;10:247–260.
10. Lovibond PF, Lovibond SH. The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. Behav Res Ther. 1995;33:335–343.
11. Christianson S, Marren J. The impact of event scale - revised (IES-R), Medsurg Nurs. 2012;21:321–322.
12. Grossman RC, Mackenzie CS, Keller DS. #SoMe4Surgery: from inception to impact. BMJ Innovations. 2020;6:72–82.
13. Ioannidis A, Blanco-Colino R, Chand M, et al. How to make an impact in surgical research: a consensus summary from the #SoMe4Surgery community. Updates Surg. 2020;72:1229–1235.
14. Eurosurveillance Editorial Team. Latest assessment on COVID-19 from the European Centre for Disease Prevention and Control (ECDC). Euro Surveill. 2020;25:2002271.
15. Litz BT, Stein N, Delaney E, et al. Moral injury and moral repair in war veterans: a preliminary model and intervention strategy. Clin Psychol Rev. 2009;29:695–706.
16. Dutheil F, Aubert C, Pereira B, et al. Suicide among physicians and health-care workers: a systematic review and meta-analysis. PLoS One. 2019;14:e026361.
17. Serafini G, Parmigiani B, Ameiro A, et al. The psychological impact of COVID-19 on the mental health in the general population. QJM. 2020;113:531–537.
18. Haider II, Tiwana F, Tahir SM. Impact of the COVID-19 pandemic on adult mental health. Pak J Med Sci. 2020;36:S90–S94.
19. World Health Organization. Report to the 58th World Health Assembly: health action in relation to crises and disasters. Prehosp Disaster Med. 2005;20:487–490.
20. Nieuwenhuijsen K, de Boer AG, Verbeek JH, et al. The depression anxiety stress scales (DASS): detecting anxiety disorder and depression in employees absent from work because of mental health problems. Occup Environ Med. 2003;60(Suppl 1):77–82.
21. Augsberger A, Yeung A, Dougher M, et al. Factors influencing the underutilization of mental health services among Asian American women with a history of depression and suicide. BMC Health Serv Res. 2015;15:542.
22. Chen H, Ma F. Underutilization of mental health services among American elders: two-dimensional policy evaluation model. Soc Work Public Health. 2019;34:457–467.
23. Lichtenhal WG, Nilsson M, Kissane DW, et al. Underutilization of mental health services among bereaved caregivers with prolonged grief disorder. Psychiatr Serv. 2011;62:1225–1229.
24. Mackenzie CS, Gekoski WL, Knox VJ. Age, gender, and the underutilization of mental health services: the influence of help-seeking attitudes. Aging Ment Health. 2006;10:574–582.
25. Banna MHA, Sayeed A, Kundu S, et al. The impact of the COVID-19 pandemic on the mental health of the adult population in Bangladesh: a nationwide cross-sectional study. Int J Environ Health Res. 2020;20:1–12.
26. El-Zoghby SM, Soltan EM, Salama HM. Impact of the COVID-19 pandemic on mental health and social support among adult Egyptians. J Community Health. 2020;45:689–695.
27. Butler BA, Butler CM, Peabody TD. Cognitive apprenticeship in orthopaedic surgery: updating a classic educational model. J Surg Educ. 2019;76:931–935.
28. Mariette C. Apprenticeship in laparoscopic surgery: Tools and methods for the surgeon in training. J Chir (Paris). 2006;143:221–225.
29. Gooding PA, Hurst A, Johnson J, et al. Psychological resilience in young and older adults. Int J Geriatr Psychiatry. 2012;27:262–270.
30. Henderson C, Noblett J, Parke H, et al. Mental health-related stigma in health care and mental health-care settings. Lancet Psychiatry. 2014;1:467–482.