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The psychological and occupational impacts of Coronavirus (COVID-19) on UK surgeons

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ABSTRACT

Background: The coronavirus disease 2019 (COVID-19) pandemic represents the greatest biopsychosocial emergency the world has faced for a century. The pandemic has changed how individuals live and work, and in particular, front-line healthcare professionals have been exposed to alarming levels of stress.

Objective: The aim of this study is to understand the professional and personal effects of COVID-19 on surgeons working in the UK National Health Service (NHS).

Setting: Surgical departments in the NHS.

Design: Between May and July 2020, as part of an on-going study, we asked surgeons two open-ended questions: "What challenges are the COVID-19 crisis currently presenting to you in your work and home life?" and "How is this stress affecting you personally?" Thematic analysis was used for the qualitative responses.

Results: 141 surgeons responded to the survey and the results indicated that 85.8% reported that they were generally negatively affected by COVID-19, of which 7.8% were strongly affected in a negative way. Qualitative thematic analysis identified four key themes from responses relating to the impact of the pandemic: (1) changing and challenging work environment as a result of COVID-19; (2) challenges to professional life and development; (3) management of change and loss in the respondents' personal lives; (4) emotional and psychological impacts.

Conclusion: The results highlighted the substantial emotional and psychological effects of COVID-19 on surgeons' mental health, particularly in relation to fear and anxiety, loss of motivation, low mood, stress and burnout. There is an urgent need for workplace support and mental health interventions to help surgeons cope with the difficulties they face during the on-going COVID-19 pandemic.

Strengths and limitations of this study

-This study provided a broad overview of how surgeons deal with difficulties, as well as an understanding of their fears and emotional and psychological problems during COVID-19.

-The study findings may encourage other researchers to explore resolutions that would improve surgeons working conditions during the COVID-19 pandemic.

- One of the limitations relates to the relatively small sample size. Therefore, it would be prudent for future research to attempt to replicate our findings in a larger sample

-The two open-ended questions may not provide a clear insight into surgeons' mental health because surgeons could describe only one aspect of how COVID-19 is affecting them.

Keywords:

COVID-19, surgeons, stress, mental health, burnout, workload, anxiety

Introduction

In December 2019, a novel coronavirus later named “severe acute respiratory syndrome coronavirus 2” (SARS-CoV-2) was first reported as the cause of an outbreak of respiratory illness in Wuhan City, China.¹ The World Health Organisation (WHO) labelled the disease caused by this virus COVID-19, short for Coronavirus Disease 2019. On January 30, 2020, the WHO announced that cases had been confirmed worldwide.²

The seriousness, scale and virulence of COVID-19 has had a major negative impact on people’s mental health.³ This is evident as many individuals are struggling to cope with the pandemic. A recent study has shown that the mental health and wellbeing of the UK adult population appears to have been substantially affected in the initial phase of the COVID-19 pandemic, especially for women, young adults, the socially disadvantaged and those with pre-existing mental health problems.⁴ In addition, the widespread outbreaks of infectious diseases, such as COVID-19, have been reported to cause public panic and mental illness.⁵ In a novel study by Li et al. (2020) the psychological impact of the COVID-19 pandemic on individuals’ mental health was investigated by analysing the word frequencies, scores of emotional indicators that include anxiety and depression, and cognitive indicators such as social risk judgment and life satisfaction from 17,865 Weibo users before and after the WHO announcement. The study found an increase in indicators of negative emotional and psychological outcomes (including depression, anxiety and anger) after the start of the pandemic.⁶ Furthermore, a study by Wang et al. (2020) that focused on frontline healthcare professionals in Wuhan during the pandemic crisis reported health professionals suffering from acute stress disorder, along with an increased prevalence of anxiety and depression. This study also observed a strong link between COVID-19 and emotional distress such as depressive symptoms and anxiety, acute stress disorder and psychosomatic symptoms (such as chest pain).⁷

In the UK National Health Service (NHS), frontline healthcare workers are likely to be particularly vulnerable to mental health issues as a result of COVID-19 outbreak. Their work environment has changed dramatically, and they have been exposed to alarming levels of stress. For instance, many NHS doctors have been required to practice outside their defined areas of expertise, and cancellations of planned surgeries have reduced training opportunities.^{8,9,10,11} A study that focused on the mental health of NHS workers

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3 during the COVID-19 pandemic found that healthcare workers experienced mild
4 depression and increased levels of stress and anxiety.¹²

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6 The lack of personal protective equipment (PPE) is another significant challenge
7 that frontline healthcare professionals have faced in their work environment, one that has
8 put NHS workers at increased risk.¹² Jessop et al. (2020) found that the lack of PPE has
9 negatively affected the mental health of healthcare staff.¹³ Moreover, recent research has
10 suggested that NHS workers during COVID-19 may also experience “moral injury”, which
11 is defined as the psychological distress that induces a person to have negative thoughts
12 about themselves or others.¹⁴

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14 A recent rapid review and meta-analysis by Kisely et al. (2020), which sought to
15 investigate the psychological effects of any emerging virus outbreak on healthcare
16 workers, found that those who are in direct contact with infected patients are the most
17 susceptible to experiencing high levels of acute or post-traumatic stress and
18 psychological distress.¹⁵ Moreover, being lower in the staff hierarchy, being a parent with
19 dependent children, or having a vulnerable or sick family member were also determined
20 to be contributing risk factors for experiencing psychological distress. This review also
21 ascertained that discrimination, disgust, stigma and lack of moral support for healthcare
22 workers may also contribute to high levels of distress.

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24 According to Gerada and Jones (2014), among health care workers, surgeons are
25 the most reluctant to seek support for mental health issues in spite of the symptoms they
26 experience, including burnout and depression.¹⁶ Their unwillingness is closely related to
27 concerns about losing their credibility as doctors and the stigma about seeking help within
28 the medical community. Furthermore, a study by Upton et al. (2012) reported a
29 concerning high rate of burnout across various surgical specialties in the UK. Their
30 study, which surveyed 1,971 surgeons from 127 NHS hospital trusts, found that one-third
31 of the respondents showed high levels of burnout or exhaustion.¹⁷

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33 However, to the best of our knowledge, there has been no study on how surgeons
34 have been affected by the current pandemic. Research is therefore urgently required
35 concerning how COVID-19 is affecting the mental health of surgeons in order to gain a
36 clear understanding in order to help inform future interventions and support plans.³
37 Therefore, the current study aimed to ask surgeons directly about the impact of the
38 COVID-19 crisis on their work and home life.

Methods

Study design and participants

This research is part of a larger longitudinal online survey investigating surgeon burnout. The survey included quantitative and qualitative questions. The main survey focused on surgeon burnout and patient care in general. In order to assess the impact of COVID-19 outbreak on surgeons, two additional questions were added whereby participants were invited to provide open-ended responses to the following questions: “What challenges are the COVID-19 crisis currently presenting to you in your work and home life?” and “How is this stress affecting you personally?”

All surgeons and surgical trainees were invited to participate in the survey between 5th May and 30th June, 2020. Participants were recruited using convenience and snowball sampling methods. Surgeons and surgical trainees working in different surgical specialties from all over the UK were invited to participate in the survey using social media channels (e.g., Twitter) and emails sent to surgeons’ email lists. The estimated time to complete the full survey was 15-20 minutes with the final COVID-19 related section taking around 5 minutes.

To determine the appropriate numbers of participants to recruit, a priori analysis was run for a correlation on G*Power imputing 90% power and setting alpha at .05. The G*Power analysis indicated that the minimum sample size needed for the research was 138. This study received ethical approval from the School of Psychology Research Ethics Committee at the University of Leeds on 4th May, 2020 (Ethics Reference No: PSYC-34).

Patient and public involvement

There were no involvement of patients and the public in the design, recruitment or conduct of this study. However, the result of this study will be open to access via publication in a journal with open-access.

Data Analysis

Both qualitative and quantitative data were analysed. For the qualitative analysis, thematic analysis was used. Thematic analysis is considered a method that outperforms other methods due to its theoretical flexibility and that it can generate unanticipated insights by providing a detailed account of the data.[18] The analysis framework

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3 developed by Braun and Clarke (2006) includes becoming familiarized with the data,
4 generating initial codes, searching for themes, reviewing themes, defining and naming
5 themes, and then producing a report. This method was chosen to highlight similarities
6 and differences across the dataset and to generate unanticipated insights into the
7 psychological and occupational effects of COVID-19 on surgeons. Responses for the
8 first and second questions were analysed together using thematic analysis.¹⁸
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14 The second question, "How is this stress affecting you personally?", however,
15 was also analysed following the approach of Taylor et al. (2010)¹⁹, which classified the
16 nature of the content into four categories: positive, neutral, mildly negative and strongly
17 negative. This allowed us to quantify the percentage of surgeons who felt the pandemic
18 was negatively impacting on them. For example, responses such as "fatalistically" and
19 "the stress is significantly affecting me badly" were rated as strongly negative.
20 Responses such as "not too badly" and "mild" were rated as mildly negative. Responses
21 such as "I have achieved a better work-life balance" was rated as a positive response,
22 while responses such as "not affected", "able to cope" and "unsure" were rated as
23 neutral responses. Two reviewers (TG and DOC) coded the content of the responses
24 and any disagreements were resolved by discussion. The inter-rater agreement
25 between coders was good resulting in a Kappa of 0.91.
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40 Results

41 A total of 141 surgeons completed the survey (31 females, 91 males, 1 other and
42 18 did not disclose). Of these, 80 (57%) were consultants, 37 (26.5 %) were specialty
43 trainees, 13 (9%) were core surgical trainees, 9 (6.2 %) were others including 2 (1.3%)
44 surgeons did not respond to this question.
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47 Seventy-five (53%) participants were from Urology followed by General Surgery
48 14 (10%), then 10 (7%) from Trauma and Orthopaedics, 8 (6%) from Neurosurgery, 8
49 (6%) for Oral and Maxillofacial, 6 (4%) from Gynaecology, 4 (3%) from Obstetrics and
50 Gynaecology, 4 (3%) from Vascular Surgery, 2 (1%) from Plastic Surgery, 2 (1%) from
51 Colorectal, whereas the rest 5 (5%) from different specialties which include Hepatobiliary
52 and Transplant Surgery, Esophagus and Gastric, Ophthalmology, Otorhinolaryngology
53 and Transplant and hepatobiliary surgery, 1 each. While 3 participants did not answer
54 the question (2%). The average age of the participants was 42.2 years (range 26-66
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years, SD 10.45). The average number of years practising as a surgeon was 14 years (range 1-37 years, SD 9.7).

The survey found that 121 surgeons (85.8%) reported being negatively affected by COVID-19, of these 11 (7.8%) experienced a strongly negative effect and 110 (78%) described mildly negative impact. In contrast, 8 (12.7%) participants reported that they were coping well during this period, and 2 (1.5%) of the respondents stated a positive effect of COVID-19.

Thematic Analysis

The thematic analysis identified four themes. The first theme references changing and challenging work environment as a result of COVID-19; the second theme identifies challenges to professional life and development; the third theme references managing change and loss in the respondents' personal lives; and the fourth theme references emotional and psychological impacts (Table 1). All quotes are provided in supplementary file, appendix 1.

Theme One: Changing and Challenging Work Environment

This theme deals with how most hospitals during COVID-19 have changed their structure, shifts, administration, staffing for COVID-19 cases, operational changes and so on. These responses detail how COVID-19 has had an impact on the work environment of surgeons.

1) Dealing with Constant Change. These subthemes explain how surgeons deal with constant change through limited capacity for operative surgery and change of work structure.

- **Limited Capacity and Operative Surgery.** This subtheme includes limited capacity and minimal operations as a result of COVID-19. Two surgeons mentioned the changes of the work environment in terms of limited capacity: "reduced capacity"; "At work ... limited capacity". Furthermore, many comments mentioned capacity specifically in the context of operative surgery (e.g. "Reduced capacity for operative surgery").
- **Change in Work Structure.** Change in work structure involves surgeons changing roles, performing work in different ways or changing work plans. There are many comments about working with unfamiliar environments

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3 (e.g., “changing pattern of work and on call”). The other comments
4 mentioned this change by using a new method to communicate with
5 patients by telephone: “New methods of working—including telephone
6 clinics”.

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10 Some comments mentioned reallocated workers performing work
11 they are unfamiliar with (e.g., “challenge of being asked to contribute to
12 areas that I have not done for years under the pretext that it is covering
13 COVID-19”). Other comments mentioned the changes arising from bad
14 planning by management, such as “Lack of leadership” and “unrealistic
15 planning by the management”. Also, some comments relate to working from
16 home (e.g., “I have had to work from home due to immunosuppressive
17 medication.”)

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24 By contrast, some respondents see this change as positive, as it
25 makes the work easier (e.g., “opportunity for more home working would be
26 beneficial”).

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30 **2) Workload and Lack of Work-life Balance.** An increased workload and a lack
31 of work-life balance are challenges that surgeons face in the work environment
32 during COVID-19. Many comments mentioned an increased workload (e.g.
33 “overworking” and “workload post pandemic”). However, many surgeons also
34 mentioned how this workload affects their work-life balance (e.g., “Working more
35 weekends. Different shift pattern than my partner so difficult to maintain a
36 reasonable home life”).

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42 **3) Surgeons Struggling with Personal Protective Equipment (PPE).** While
43 working during COVID-19, surgeons face many problems related to PPE, including
44 lack of PPE; discomfort associated with wearing PPE.

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48 Selected comments mentioned that there is a lack of PPE and that surgeons
49 struggle with the “ability to deliver care due to lack of PPE”. Some of the other
50 surgeons struggle with how PPE makes communication difficult (e.g., “Carrying
51 out emergency surgeries with less familiar teams and adapting the ways of
52 communication during the case due to PPE”). Other surgeons struggle with
53 spending lots of time donning and doffing PPE and doing infection control in work
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3 and when they return home “(e.g., “on-COVID wards means spending lots of time
4 donning/doffing PPE rather than seeing patients”).
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7 ***Theme Two: Challenges to Professional Life and Development***

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9 This theme describes how COVID-19 has affected surgeons’ performance at work
10 and their experience of professional development.
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14 **1) Impact on Surgeons’ Performance.** Some surgeons commented about
15 difficulties in planning and making decisions (e.g., “It is intellectually tiring to make
16 decisions”). Many also mentioned about how COVID-19 affects their performance
17 by making them less productive and slower at work “Less productive and
18 innovative”; “Work is mundane and slow.” In addition to difficulties in planning and
19 lack of productivity, several comments relate to surgeons feeling tired and even
20 exhausted during the period of COVID-19 (e.g., “Tired, often struggle to find
21 motivation”).
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25 **2) Impact on Surgeons’ Development.** A number of comments express how
26 COVID19 affects training (e.g., “Training severely limited” and “Zero access to any
27 training, either in theatre or clinic.”). Apart from the lack of training, many surgeons
28 expressed their concern about achieving an Annual Review of Competence
29 Progression (ARCP) “worry about achieving competency for ARCP”).
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38 ***Theme Three: Management of Change and Loss in Personal Lives***

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40 This theme describes the effects of COVID-19 on surgeons’ lives outside work.
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43 **1) Childcare Issues.** Most comments about how COVID-19 affects surgeons’
44 lives are about how surgeons struggle with childcare issues (e.g., “Difficult
45 having teenagers at home with school being closed” and “struggled with
46 childcare”).
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49 **2) Communication with Family.** Several participants expressed how, in order to
50 not transmit COVID-19, their communication with their family was affected: “Not
51 being able to live with my wife as having to live near hospital in Travelodge -
52 makes communication harder” and “Not being able to travel and support elderly
53 parents abroad in case they run into problems”.
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58 **3) Cancellation of Life Plans such as Weddings and Honeymoons.** There
59 were also some personal challenges, such as having to cancel honeymoons or
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weddings: “Postponement of our wedding” and “Wedding, honeymoon and annual leave cancelled”.

- 4) **Reduce Leisure Opportunity.** In addition, reduced leisure opportunities were mentioned (e.g., “travel. The pub is shut and I can’t go on holiday” and “Home life - still seem to be working stressful days but little to no balance with sports or leisure, so life seems fairly imbalanced”. By contrast, one comment mentioned the increased leisure opportunities: “Less work, more family time, and more golf!”
- 5) **Poor Sleep.** Eight comments expressed participants’ struggles with poor sleep. These included quality of sleep and lack of sleep (e.g., “Strange dreams!” and “struggling to sleep sometimes”).
- 6) **Lost Income.** Two comments are about lost income (“loss of private income” and “Loss of private practice has huge financial implications which are worrying”

Theme Four: Emotional and Psychological Impact

This theme describes psychological and emotional effects during the COVID-19 pandemic.

- 1) **Fear and Anxiety.** Surgeons’ fear and anxiety about the disease and bringing the virus home was raised numerous times. Many comments describe feeling of fear, for example: “fear of bringing the virus home and infecting my family and my mother in law with lung cancer” and feeling “Anxious about bringing the virus home”.

Concern about Patients and Work. This refers to surgeons’ concerns about being responsible for their patients and work: “I am concerned about the impact on non-cancer patients, particularly neuropathic patients” and “Feeling pressure to find patients with cancer and enable them to have the care they need with the current limited system”.

Anticipatory Anxiety and Uncertainty. This category relates to many comments that expressed surgeons’ concerns about the future and uncertainty (e.g., “feeling of anticipation of things getting worse” and “What will my job look like in the coming months/years and how will I be able to arrange family commitments/childcare around this”.

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- 2) Loss of Motivation.** Feeling bored and having decreased motivation levels at work is considered one of the emotional impacts of COVID-19: “Decreased motivation at work” and “Tired, often struggling to find motivation”.
- 3) Low Mood.** Participants reported having low moods during COVID-19, including feeling irritable (e.g., “very much, started having irritability [sic]” and “anger”. Participants also expressed feeling unsettled (“Feel more unsettled than usual”) or even becoming more emotional (“Makes me a lot more emotional than I have ever been”) or feeling hopeless and annoyed: “Feeling hopeless”). One participant expressed a feeling of giving up and feeling unable to adapt: “I try to cope. Sometimes I feel that I am gonna give up.”
- From the opposite side, some surgeons mentioned they are adapting to this current situation: “New way of life requiring rapid adaptation” and “adapting to work and out of work life”.
- 4) Stress and Burnout.** Stress and burnout were also considered some of the key emotional and psychological effects of COVID-19. Several comments mentioned “I feel burned out” and “Very stressed at the start of the pandemic over catching COVID”. However, one remark shows the opposite and mentioned this time during COVID-19 is *less* stressful: “I don’t feel more stressed. Maybe even less”.

Discussion

This study aimed to understand the professional and personal effects of the COVID-19 pandemic on practicing surgeons. It found that 8 out of 10 surgeons reported that they were negatively affected by COVID-19, with many respondents highlighting the increased challenges of their work environment. Respondents also emphasised the need to manage change in their professional and personal lives. Finally, the results of this study underscore the substantial emotional and psychological effects of COVID-19 on surgeons' mental health, particularly in relation to fear and anxiety, loss of motivation, low mood, stress and burnout. These findings are important because the demands of the surgical aspects of healthcare are different to other medical specialities, therefore, they call for different approaches to support surgeons.

The qualitative analysis of surgeons' comments revealed the changing and challenging work environments resulting from COVID-19, including surgeons' worries about the delay and cancellation of planned operations. The consistency of the working in hospital settings has drastically changed due to the pandemic; COVID-19 cases have been prioritised because of their urgency. This is bound to disturb the standard operating procedures in surgical cases and cause complications and untimely responses to patients, while even inducing unwanted stress in surgeons. This is in accordance with Soreide et al. (2020), who found that COVID-19 can affect the long-term delivery of surgical services and lead to cancellations and delays.²⁰ Similarly, Chadi et al. (2020) found that almost 27% of respondents mentioned interruptions in the delivery of surgical services.²¹

Limited PPE was also one of the major challenges surgeons reported facing during the pandemic. We found that shortages of PPE negatively impacted surgeons, making them fearful and anxious about their own safety and the safety of their patients and their families. This result is similar to findings reported in a study by Jessop et al. (2020), which found that the lack of PPE combined with changing and unclear structures in the work environment resulted in confusion and anxiety for healthcare staff.¹³ In the hospital setting, administrators and healthcare teams should have already set up standard guidelines to follow for effective operations that include adequate precautions in response to potential pandemics, which are vital since surgical operations are highly invasive and pose greater risks for both patients and surgeons.²² If these guidelines are properly followed, surgeries are still expected to proceed, even in the midst of the pandemic, and minimal cancellations due to risk of infection will be expected, all of which will improve the

1 working conditions for surgical teams. Consideration must also be given to surgeons who
2 have high-risk family members, such as elderly relatives, children and even other
3 healthcare workers, all of which may contribute to higher levels of anxiety for surgeons
4 themselves.²³
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9 The second and third themes to emerge from this study relate to the challenges to
10 surgeons' personal and professional lives and their development during the COVID-19
11 pandemic. From the perspective of training practitioners, adjustments to educational
12 programs in response to this unexpected interruption should be put into place to minimize
13 the disruption of the continuity of learning. In light of this, a lack of training is one of the
14 main aspects of this theme that affects surgeons negatively. This result is consistent with
15 a previous study of surgeons in Italy, which found that the COVID-19 pandemic had a
16 negative impact on their educational programme, which includes a training component.²⁴
17 Furthermore, 80% of surgeons who participated in a survey in India reported that their
18 learning had been adversely affected by COVID-19.²⁵ Hence, training hospitals should
19 take this into consideration and reassure trainees. This study recommends the
20 formulation of clear guidelines to compensate for cancelled training courses and lost time
21 when the effects of the pandemic abate, which might help mitigate the stress that
22 surgeons are currently experiencing. This study also recommends that virtual training and
23 training based on simulations should be considered during the pandemic. These
24 adaptations have been universally tested through remote learning methods and have
25 been found to be increasingly effective, even in the niche of surgery.²⁶ In lieu of the lost
26 opportunity to experience in-hospital skills, virtual programs must be supplemented by in-
27 hospital skills training to compensate.
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43 Besides the training setting, personal and psychosocial needs are also expected
44 to be part of surgeons' coping strategies. Proper scheduling of hospital duties will allow
45 surgeons to have quality time for their families and themselves, allowing recovery from
46 the demands of work.²⁷ Knowing the adaptations currently practiced by surgeons that
47 have been shown to be effective should be discussed further so that these coping
48 mechanisms can be disseminated throughout the surgical community and help
49 administrations and managers foster better adaptations within their institutions.
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56 The fourth theme that emerged from this study relates to the management of
57 change and loss in the respondents' personal lives and to the emotional and
58 psychological impacts surgeons are experiencing during COVID-19. The current findings
59 are consistent with those of Li et al. (2020), who found that COVID-19 negatively affected
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mental health because of the special precautions required that may affect effective communication, personal contact and overall interaction, all of which are vital components of healthy psychosocial well-being.⁶ The personal and psychosocial effects of working through the pandemic on surgeons must not be disregarded as they can affect their quality of work and the success of their interventions. Moreover, there is growing evidence to show that job strain, burnout and low wellbeing are associated with poor patient safety and medical errors.²⁸ In addition, such impacts may create long-term complications in surgeons' well-being that can affect them even after the pandemic subsides. A study by Lu et al. (2020) found that frontline COVID-19 medical staff suffered more from fear, anxiety and depression than they did before the pandemic.²⁹ Focusing on frontline healthcare professionals, a study by Wang et al. (2020) found many suffering from acute stress disorder, with a high prevalence of anxiety and depression.⁷ Evidently, the additional challenges of working in a clinical setting have already contributed to high levels of mental distress in healthcare workers. Three recent studies have shown that healthcare staff working with COVID-19 patients are experiencing very high levels of anxiety and depression.^{30,31,32} Furthermore, the current findings also support Wu et al.'s (2020) results that have shown that COVID 19 has had a significant impact on health workers' worries about infection and about their families, as well as on their sleep quality.³³ With deteriorating mental health, it is likely that the effectiveness of each healthcare worker is compromised and this may impact on their well-being for an extended period of time.

The current study has a number of limitations that ought to be acknowledged. First, the two open-ended questions may not provide a clear insight into surgeons' mental health because surgeons could describe only one aspect of how COVID-19 is affecting them (such as how working during the pandemic affects their family). The second limitation is that we could have conducted semi-structured interviews in order to gain a more in-depth understanding of the problems relating to the pandemic. However, we felt that it was unreasonable to ask surgeons to participate in such detailed interviews during these stressful times when surgeons are already under immense pressure. Nevertheless, it is important to note that it is clear from the thematic analysis that we still received a broad range of responses yielding a rich dataset. The third limitation relates to the relatively small sample size. We are aware that the sample size may be considered a shortcoming and that it may limit the generalisability of some of the findings. Therefore, it would be prudent for future research to attempt to replicate our findings in a larger sample.

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The aforementioned limitations notwithstanding, the current study also has several strengths. First, the results may have broader implications for fully understanding and being aware of the psychological and occupational effects of COVID-19 on UK surgeons. The study findings may encourage other researchers to investigate the psychosocial effects of the pandemic on the working practices of surgeons and explore resolutions that would improve their working conditions. Furthermore, this study encompasses surgeons from different specialties, regions and grades, which provided a broad overview of how surgeons deal with difficulties, as well as an understanding of their fears and emotional and psychological problems during COVID-19. In addition, it was clear that each subspecialty and demographic group had its own challenges that can be brought to light, especially ones usually missed by other studies. In addition, this study used thematic analysis, which is considered a flexible method to identify themes based on participants' answers.

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In conclusion, this study found that over 80% of surgeons reported being negatively affected by COVID-19 with many respondents highlighting the increased challenges of their work environment. Respondents also emphasised the need to manage change in their professional and personal lives. The results also highlighted the substantial emotional and psychological effects of COVID-19 on surgeons' mental health, particularly in relation to fear and anxiety, loss of motivation, low mood, stress and burnout. There is an urgent need for workplace support and mental health interventions to help surgeons cope with the difficulties they face during the on-going COVID-19 pandemic.

41 **Authors' contributions:**

42 T.G., J.J., SB and DOC were responsible for designing and implementing the research,
43 analysing the results and the writing of the manuscript.

44 **COMPETING INTEREST**

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46 The authors declare that they have no conflict of interest.

47 **Patient consent for publication**

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50 Not required

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Table 1. Themes, descriptions, subthemes, example

Themes	Descriptions	Subthemes	Example
Changing and challenging work environment	Most hospitals during COVID-19 have changed their structure, including shifts, administrative staffing for COVID-19 cases, operational changes and so on. These responses detail how COVID-19 has affected the work environment of surgeons.	1) Dealing with constant change <ul style="list-style-type: none"> Limited capacity Change in work structure 2) Increased workload and lack of work-life balance 3) Surgeons struggling with Personal Protective Equipment (PPE)	"Reduced capacity for operative surgery" "changing pattern of work and on call" "increased work load" "Lack of PPE"; "PPE makes it difficult for patients to hear you and see your non-verbal response"
Challenges to professional life and development	This theme describes how COVID-19 has affected surgeons' performance at work and their experience of professional development.	1) Impact on surgeon's performance <ul style="list-style-type: none"> Difficult to make decisions Less productive/Work slow Tired 2) Impact on surgeon's development	"It is intellectually tiring to make decisions" "not being able to do my job adequately" "Make me feel tired" "Zero access to any training, either in theatre or clinic"
Management of change and loss in personal lives	This theme describes the effects of COVID-19 on surgeons' lives outside work.	1) Childcare issues 2) Communication with their family 3) Having to cancel honeymoons/weddings 4) Reduced leisure opportunities 5) Poor sleep 6) Lost income	"Children off school—childcare challenges because both of us are key workers and school provision does not have options before and after school care" "loss of communication with wife" "Wedding, honeymoon and annual leave cancelled" "Travel. The pub is shut and I can't go on holiday" "Some sleeplessness" "Loss of private income"

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Emotional and psychological impacts	This theme describes psychological and emotional conflict during COVID-19	<p>Fears and anxiety</p> <p>Loss of motivation and feeling bored</p> <p>Low mood</p> <p>Stress and burnout</p>	<p>“fear of bringing virus home and infect[ing] my family and my mother in law with lung cancer”;</p> <p>“Increased anxiety about the future”</p> <p>“often struggle to find motivation”; “boredom”</p> <p>“very much, started having irritability”; “Feeling hopeless”</p> <p>“Very stressful both at home and work”; “burnout”</p>
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Themes and associated responses

Theme	Responses
Limited capacity for surgery	<p><i>"reduced capacity"</i></p> <p><i>" At work,,, limited capacity"</i></p> <p><i>"Reduced capacity for operative surgery"</i></p> <p><i>"unable to operate as much, waiting lists increasing"</i></p> <p><i>"inability to carry out surgery"</i></p> <p><i>lack of operating"</i></p> <p><i>"Not being able to do my job as before, e.g. operating to same degree"</i></p> <p><i>"Minimal operating"</i></p> <p><i>"no operating time "</i></p> <p><i>"Limited operating due to elective lists being cancelled"</i></p> <p><i>" reduced elective operating".</i></p> <p><i>"Less operating time"</i></p> <p><i>"less operating"</i></p> <p><i>"Less operating!"</i></p>
<ul style="list-style-type: none"> Change the work structure 	<p><i>"Change in working structure"</i></p> <p><i>"Constant change"</i></p> <p><i>"working out of normal environment"</i></p> <p><i>"changing pattern of work and on call"</i></p> <p><i>"Multiple changes every week. Hard to keep some semblance of continuity"</i></p> <p><i>"Changed job which is very stressful."</i></p> <p><i>"New way of life requiring rapid adaptation."</i></p> <p><i>"New type of work"</i></p> <p><i>"Working in unfamiliar environment"</i></p> <p><i>"Unusual work patterns"</i></p> <p><i>"changes to work pattern".</i></p> <p><i>"Disruption to routine"</i></p> <p><i>"New methods of working- including telephone clinics"</i></p>

	<p><i>"I've been deployed to telephone patients referred as suspected cancers".</i></p> <p><i>"Mostly virtual clinics, and taking decisions on 2wk cancer referrals without direct examination of patients."</i></p> <p><i>"challenge of being asked to contribute to areas that I have not done for years under the pretext that it is covering COVID-19"</i></p> <p><i>"Carrying out emergency surgeries with less familiar teams "</i></p> <p><i>" I work in cancer surgery and many of my team have been reallocated yet the service has continued"</i></p> <p><i>"trauma and anxiety of potentially being forced to do things that I am not practiced at currently and so patient safety and incidents."</i></p> <p><i>"Lack of leadership"</i></p> <p><i>" unrealistic planning by the management."</i></p> <p><i>"the inefficiency of the system and uber managerial approach which makes everyone lazy and slower than before"</i></p> <p><i>"Day to day work not really matching job plan"</i></p> <p><i>"there are no facilities to rest during on calls"</i></p> <p><i>"I have had to work from home due to immunosuppressive medication."</i></p> <p><i>"Academic work from home difficult with very young children"</i></p> <p><i>"Research affected as lab closed"</i></p> <p><i>"Significant changes to working practice with more involvement with management and service delivery as a trainee"</i></p> <p><i>"Opportunity for more home working would be beneficial"</i></p> <p><i>"increased time at home, increased time for audit/research"</i></p> <p><i>"better work life balance"</i></p> <p><i>"More logistics".</i></p>
<p>2-Increased workload and Lack of work-life balance</p>	<p><i>"overworking"</i></p> <p><i>"increased work load"</i></p> <p><i>"Very long turnover between patients (surgery)."</i></p> <p><i>"increased on call"</i></p>

	<p><i>"Changed job which is very stressful"</i></p> <p><i>" More on calls"</i></p> <p><i>"due to increase in number of on calls"</i></p> <p><i>"workload post pandemic"</i></p> <p><i>" stress at work"</i></p> <p><i>"Working more weekends/OOH. Different shift pattern than my partner so difficult to maintain a reasonable home life"</i></p> <p><i>"Significant interruption to home life and plans."</i></p> <p><i>"Disruption in training and work life"</i></p> <p><i>" lack of clarity in job role and increased work pressure meaning more stress and fatigue"</i></p> <p><i>"Struggling to manage work life balance"</i></p> <p><i>"My wife and I are both doctors, so work/life balance is hard due to COVID"</i></p> <p><i>"no job satisfaction"</i></p> <p><i>"Extending into personal time and out of work life".</i></p>
<p>3-Surgeons struggling with Personal Protective Equipment PPE</p>	<p><i>"ability to deliver care due to lack of PPE"</i></p> <p><i>"lack of PPE".</i></p> <p><i>"I cannot go on too long operating with PPE. Neck hurts. It's just living hell."</i></p> <p><i>"PPE makes it difficult for patients to hear you and see your non-verbal response"</i></p> <p><i>"Carrying out emergency surgeries with less familiar teams and adapting the ways of communication during the case due to PPE"</i></p> <p><i>"non-covid wards means spending lots of time donning / doffing PPE rather than seeing patients"</i></p> <p><i>"additional time needed for all tasks from hand washing, to donning and doffing, to hygiene measures on entering home from work to ensure family members are not affected"</i></p> <p><i>"infection control measures both at work and home".</i></p>
<p>Impact on surgeon performance</p>	<p><i>"Difficult to plan and do things."</i></p>

<p>include (Hard to make decisions, Less productive/Work slow and Tired)</p>	<p><i>"It is intellectually tiring to make decisions"</i></p> <p><i>"Potential for making the wrong decision leading to adverse outcomes for patients"</i></p> <p><i>"Less productive and innovative"</i></p> <p><i>"Work is mundane and slow."</i></p> <p><i>"Lack of work productivity can be frustrating"</i></p> <p><i>"not being able to do my job adequately".</i></p> <p><i>"Not able to work as much as usual"</i></p> <p><i>"the inefficiency of the system and uber managerial approach which makes everyone lazy and slower than before"</i></p> <p><i>"tired"</i></p> <p><i>"Tired and not sleeping well"</i></p> <p><i>"Feel more tired and worn out."</i></p> <p><i>"More tired"</i></p> <p><i>"Tired, often struggle to find motivation"</i></p> <p><i>"Tiring"</i></p>
<p>2-Impact on surgeon's experience/development</p> <p>Theses include Training Programme Directors (TPDs) or achieving An Annual Review of Competence Progression (ARCP)</p>	<p><i>"Training severely limited"</i></p> <p><i>"Disruption in training"</i></p> <p><i>"Worry about training"</i></p> <p><i>"impact on training"</i></p> <p><i>"Decimation of training opportunities."</i></p> <p><i>"lack of training "</i></p> <p><i>"Training largely ceased despite remaining in specialty and with the need for operating off site loss of consultant support and supervision"</i></p> <p><i>"There is almost no training"</i></p> <p><i>"Zero access to any training, either in theatre or clinic."</i></p> <p><i>"Disrupting training"</i></p> <p><i>"No training"</i></p> <p><i>"Reduced training opportunities."</i></p> <p><i>"Loss of learning opportunities"</i></p> <p><i>"Training opportunities reduced"</i></p>

	<p><i>"TPD still wants us to show progression in specialty despite significantly reduced elective work"</i></p> <p><i>"worry about achieving competency for ARCP"</i></p> <p><i>"The stress is mostly with the unknown of ARCP outcomes".</i></p> <p><i>"The ARCP outcomes due to covid-19 have been poorly thought out and will be poorly executed to the detriment of trainees."</i></p>
1-Childcare issues	<p><i>"Childcare issues"</i></p> <p><i>"Childcare is a huge problem."</i></p> <p><i>"Difficult having teenagers at home with school being closed"</i></p> <p><i>"Childcare issues with nursery closing just before return"</i></p> <p><i>"struggled with child care."</i></p> <p><i>"Making difficult planning to pick up children"</i></p> <p><i>"tensions with adult children who have returned home"</i></p> <p><i>"Children off school and wife having to juggle her job / childcare and home schooling. Trying to ensure I'm home as much as possible. "</i></p> <p><i>"Childcare"</i></p> <p><i>"Childcare "</i></p> <p><i>"My boys aged 15 and 12 are missing school and I am worried about them "</i></p> <p><i>" Children off school-childcare challenges because both of us are key workers and school provision does not have options before and after school care"</i></p> <p><i>"Child care with schools being closed"</i></p> <p><i>"Home situation can also be very stressful with kids at home so I feel I am dealing with stress at home and stress at work."</i></p> <p><i>"Childcare (husband was admitted to hospital and I needed to take parental leave) and eldest child very anxious about the pandemic"</i></p> <p><i>"more emotional support for children at home"</i></p>
2-Communication with their family	<p><i>"Not being able to live with my wife as having to live near hospital in travel lodge - makes communication harder"</i></p>

	<p><i>"Fear of taking virus home to family. Fear from partner that I will bring the virus home."</i></p> <p><i>"infecting loved one"</i></p> <p><i>"all I am doing is looking after hospital inpatients. I live alone, my partner is in another deanery, and I've not seen her since it started."</i></p> <p><i>"Not being able to travel and support elderly parents abroad in case they run into problems"</i></p> <p><i>"Stressful regarding concerns of family wellbeing due to my work."</i></p> <p><i>"Significantly as a BAME member who has a vulnerable adult at home"</i></p> <p><i>"Cannot visit my family"</i></p> <p><i>"Less social events"</i></p> <p><i>" lack of family support as they live out of area and unable to visit on time off."</i></p> <p><i>"wife anxious/furloughed"</i></p> <p><i>"loss of communication with wife. "</i></p> <p><i>"I'm worried as both my husband and I are doctors. And also the hassle of staying in hospital for on calls as I live far away."</i></p> <p><i>"Reduced social activities"</i></p> <p><i>"less time to socialise"</i></p> <p><i>"Less time spent with friends "</i></p> <p><i>"Unable to see family and friends"</i></p> <p><i>"Because of the travel restrictions and the fact that I work away from home, I have not been home for three months"</i></p> <p><i>"Cannot meet friends"</i></p>
3-Having to cancel honeymoons/wedding	<p><i>"Postponement of our wedding"</i></p> <p><i>"Wedding, honeymoon and annual leave cancelled".</i></p>
Reduced leisure opportunities	<p><i>"travel. The pub is shut and I can't go on holiday"</i></p>

	<p><i>" Home life - still seem to be working stressful days but little to no balance with sports or leisure, so life seems fairly imbalanced"</i></p> <p><i>"Not getting enough exercise. Socializing is nonexistent."</i></p> <p><i>"Reduced social activities"</i></p> <p><i>"Less work, more family time, more golf!"</i></p>
5-Poor sleep	<p><i>"Some sleeplessness"</i></p> <p><i>" Strange dreams!"</i></p> <p><i>"Poor sleep"</i></p> <p><i>"not sleeping well"</i></p> <p><i>"Occasional difficulty sleep"</i></p> <p><i>"not sleeping"</i></p> <p><i>"struggling to sleep sometimes"</i></p> <p><i>"Less sleep"</i></p>
Lost income:	<p><i>"loss of private income."</i></p> <p><i>"Loss of private practice has huge financial implications which are worrying"</i></p>
<i>Fears and anxiety</i>	<p><i>"Feeling unsafe when seeing positive patients"</i></p> <p><i>"fear of bringing virus home and infect my family and my mother in law with lung cancer."</i></p> <p><i>"Concerns over taking the virus home to my vulnerable wife who is pregnant with 3rd trimester complications. This is the most stressful component of the situation."</i></p> <p><i>"Not to bring the virus to my family"</i></p> <p><i>"Exposure to family via me - biggest challenge"</i></p> <p><i>"concerns over personal safety"</i></p> <p><i>"the risk of contracting covid"</i></p> <p><i>"bringing it home"</i></p> <p><i>"Anxious about bringing the virus home"</i></p> <p><i>"anxiety about safety"</i></p> <p><i>"Anxiety about catching covid and passing on to family"</i></p> <p><i>"Worry about my family"</i></p> <p><i>"Anxiety"</i></p> <p><i>"causing severe anxiety"</i></p>

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4	<i>"Felt more worried about life"</i>
5	<i>"Slight worry about getting infection."</i>
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7	<i>"Constant worry about not missing diagnosis and personal risk"</i>
8	<i>"The worry about cartying the virus home doesnt stop."</i>
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10	<i>"I am concerned about the impact on non cancer patients,</i>
11	<i>particularly neuropathic patients"</i>
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13	<i>"feeling of work piling up that has been deferred"</i>
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15	<i>"suffering due to delayed treatment"</i>
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17	<i>"Feeling pressure to find patients with cancer and enable them</i>
18	<i>to have the care they need with the current limited system"</i>
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20	<i>"decisions to postpone treatment if not urgent"</i>
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22	<i>"very few patients are getting treatment in a timely manner. "</i>
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24	<i>"Limited operating due to elective lists being cancelled"</i>
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26	<i>"concern about patients and trainees and how we will manage</i>
27	<i>both groups going forward"</i>
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29	<i>"Difficulty managing risk for patients who one cannot see"</i>
30	
31	<i>"Feel very frustrated regarding the unnecessary negative impact</i>
32	<i>some of these policies are having on patients (without the option</i>
33	<i>to bend the rules as no two situations are the same)!"</i>
34	
35	<i>"it is frustrating to see patients suffer "</i>
36	
37	
38	<i>"Protect myself and my patients."</i>
39	
40	<i>"Unsettling in terms on impact on patient"</i>
41	
42	<i>"Inability to carry out cancer diagnostic work. We are storing up</i>
43	<i>major trouble here."</i>
44	
45	<i>"Worry about delayed diagnosis for my patients and resultant</i>
46	<i>litigation that may follow"</i>
47	
48	<i>"Unable to provide care to patients with benign conditions."</i>
49	
50	<i>"Not being able to see my patients or offer my hand when</i>
51	<i>needed while breaking bad news"</i>
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54	<i>"Constant worry about not missing diagnosis".</i>
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56	<i>"feeling of anticipation of things getting worse"</i>
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	<p><i>"Concerns What will my job look like in the coming months/ years and how will I be able to arrange family commitments/ childcare around this"</i></p> <p><i>"Worried about uncertainties (short and long term)- second wave of infection, economic aspects and whether we will be able to travel home to see our parents and extended family"</i></p> <p><i>"concern about patients and trainees and how we will manage both groups going forward"</i></p> <p><i>" Increased anxiety about the future"</i></p> <p><i>"Fear of unknown"</i></p> <p><i>"Uncertainty is unnerving"</i></p> <p><i>"Added stress and uncertainty".</i></p>
Loss of motivation and feeling bored	<p><i>"Unable to do usual enjoyable tasks at work. "</i></p> <p><i>"Decreased motivation at work."</i></p> <p><i>"Boredom"</i></p> <p><i>"Loss of enthusiasm"</i></p> <p><i>"Feeling of boredom and lack of enthusiasm at times"</i></p> <p><i>"each day very similar "</i></p> <p><i>"Less productive and innovative as less motivation at work", "boredom"</i></p> <p><i>"though boredom is creeping in this past week (may 10)", "Bored at home"</i></p> <p><i>"Tired, often struggle to find motivation".</i></p> <p><i>"Boredom at work, frustration of not being able to get on with treating our orthopaedic patients"</i></p> <p><i>"Getting bored of mundane jobs"</i></p> <p><i>"I feel more tired and irritable than usual"</i></p> <p><i>"Feel very frustrated!"</i></p> <p><i>"frustration, irritability"</i></p> <p><i>"it is frustrating to see patients suffer "</i></p>
Low mood	<p><i>"very much, started having irritability"</i></p> <p><i>"I feel more irritable than usual"</i></p> <p><i>"anger"</i></p>

	<p>"A bit angry and short tempered at work".</p> <p>"irritable "</p> <p>"Agitated"</p> <p>"Feel irritable at home"</p> <p>"Feel more unsettled than usual".</p> <p>"Makes me a lot more emotional than I have ever been."</p> <p>"Chaos"</p> <p>"Feeling hopeless "</p> <p>"Annoying"</p> <p>"Feel lonely at times"</p> <p>"depressed at times"</p> <p>"Depression"</p> <p>"Depressed most of the time"</p> <p>"I try to cope. Sometimes I feel that I am gonna give up."</p> <p>"Coping at present but reduced leisure opportunities mean less ability to de-stress and unwind"</p> <p>"not really as i have adapted"</p> <p>"New way of life requiring rapid adaptation."</p> <p>"Reduced social activities and ability to unwind from work stress"</p> <p>"Adapting to constantly evolving policies"</p> <p>"adapting to work and out of work life"</p> <p>"Feel lonely at times"</p>
Stress and burnout	<p>"working is more stressful than normal"</p> <p>"burnout"</p> <p>"Increased stress"</p> <p>"Stress"</p> <p>"Feeling slightly more stressed"</p> <p>"Stress about extra waiting list and work pressure when we return to normal work causing severe anxiety"</p> <p>"I feel burned out."</p> <p>"Added stress"</p>

	<p><i>"Very stressed at the start of the pandemic over catching covid"</i></p> <p><i>"Very stressful both at home and work".</i></p> <p><i>"Increased stress related to work not getting done"</i></p> <p><i>"added stress"</i></p> <p><i>"I have stress that comes home with me"</i></p> <p><i>"I don't feel more stressed. Maybe even less"</i></p>
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The psychological and occupational impact of the Coronavirus (COVID-19) pandemic on UK surgeons: A qualitative investigation

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ABSTRACT

Background: The coronavirus (COVID-19) pandemic represents the greatest biopsychosocial emergency the world has faced for a century. The pandemic has changed how individuals live and work, and in particular, front-line healthcare professionals have been exposed to alarming levels of stress.

Objective: The aim of this study is to understand the professional and personal effects of COVID-19 pandemic on surgeons working in the UK National Health Service (NHS).

Setting: Surgical departments in the NHS.

Design: Between May and July 2020, as part of an on-going study, we asked surgeons two open-ended questions: "What challenges are the COVID-19 crisis currently presenting to you in your work and home life?" and "How is this stress affecting you personally?" Thematic analysis was used for the qualitative data. Responses to the second question were also categorised into four groups reflecting valence: positive, neutral, mildly negative and strongly negative.

Results: A total of 141 surgeons responded to the survey and the results indicated that 85.8% reported that they were generally negatively affected by the COVID-19 pandemic, of which 7.8% were strongly affected in a negative way. Qualitative thematic analysis identified four key themes from responses relating to the impact of the pandemic: (1) changing and challenging work environment as a result of COVID-19; (2) challenges to professional life and development; (3) management of change and loss in the respondents' personal lives; (4) emotional and psychological impacts.

Conclusion: The results highlighted the substantial emotional and psychological effects of the COVID-19 pandemic on surgeons' mental health, particularly in relation to fear and anxiety, loss of motivation, low mood, stress and burnout. There is an urgent need for workplace support and mental health interventions to help surgeons cope with the difficulties they face during the on-going COVID-19 pandemic.

Strengths and limitations of this study

- This study included surgeons with different specialities, grades (core surgical trainees to consultants), qualifications and regions to give broad insight into the psychological and occupational impact of the COVID-19 pandemic on UK surgeons.
- Two authors worked independently to code the data regarding the valence of the impact of the pandemic on surgeons, minimising subjective coding bias.
- We were not able to monitor our response rate and as such it is not possible to know whether our sample reflected the wider population of UK surgeons from which it was recruited.
- The study relied upon surgeons' self-report of their own experiences and mental wellbeing.

Keywords:

COVID-19, surgeons, stress, mental health, burnout, workload, anxiety

Introduction

In December 2019, a novel coronavirus later named “severe acute respiratory syndrome coronavirus 2” (SARS-CoV-2) was first reported as the cause of an outbreak of respiratory illness in Wuhan City, China.¹ The World Health Organisation (WHO) labelled the disease caused by this virus COVID-19, short for Coronavirus Disease 2019. On January 30, 2020, the WHO announced that cases had been confirmed worldwide.²

The seriousness, scale and virulence of COVID-19 have had a major negative impact on people’s mental health.³ This is evident as many individuals are struggling to cope with the pandemic. A recent study has shown that the mental health and wellbeing of the UK adult population appears to have been substantially affected in the initial phase of the COVID-19 pandemic, especially for women, young adults, the socially disadvantaged and those with pre-existing mental health problems.⁴ In addition, the widespread outbreaks of infectious diseases, such as COVID-19, have been reported to cause public panic and mental illness.⁵ In a novel study by Li et al. (2020) the psychological impact of the COVID-19 pandemic on individuals’ mental health was investigated by analysing the word frequencies, scores of emotional indicators that include anxiety and depression, and cognitive indicators such as social risk judgment and life satisfaction from 17,865 Weibo users before and after the WHO announcement. The study found an increase in indicators of negative emotional and psychological outcomes (including depression, anxiety and anger) after the start of the pandemic.⁶ Furthermore, a study by Wang et al. (2020) that focused on frontline healthcare professionals in Wuhan during the pandemic crisis reported health professionals suffering from acute stress disorder, along with an increased prevalence of anxiety and depression. This study also observed a strong link between COVID-19 pandemic and emotional distress such as depressive symptoms and anxiety, acute stress disorder and psychosomatic symptoms (such as chest pain).⁷

In the UK National Health Service (NHS), frontline healthcare workers are likely to be particularly vulnerable to mental health issues as a result of COVID-19 outbreak. Their work environment has changed dramatically, and they have been exposed to alarming levels of stress. For instance, many NHS doctors have been required to practice outside their defined areas of expertise, and cancellations of planned surgeries have reduced training opportunities.^{8,9,10,11} A study that focused on the mental health of NHS workers during the COVID-19 pandemic found that healthcare workers experienced mild

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3 depression and increased levels of stress and anxiety.¹²
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5 The lack of personal protective equipment (PPE) is another significant challenge
6 that frontline healthcare professionals have faced in their work environment, one that has
7 put NHS workers at increased risk.¹² Jessop et al. (2020) found that the lack of PPE has
8 negatively affected the mental health of healthcare staff.¹³ Moreover, recent research has
9 suggested that NHS workers during COVID-19 pandemic experienced “moral injury”,
10 which is defined as the psychological distress that induces a person to have negative
11 thoughts about themselves or others.¹⁴
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17 A current rapid review and meta-analysis by Kisely et al. (2020), which sought to
18 investigate the psychological effects of any emerging virus outbreak on healthcare
19 workers, found that the staff who are in direct contact with infected patients were more
20 susceptible to experience high levels of acute or post-traumatic stress and psychological
21 distress.¹⁵ Moreover, being lower in the staff hierarchy, or parent with dependent children,
22 or having a vulnerable or sick family member were also determined to be contributing risk
23 factors for facing psychological distress. This review also ascertained that discrimination,
24 disgust, stigma and lack of moral support for healthcare workers may also contribute to
25 high levels of distress.
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32 According to Gerada and Jones (2014), among health care workers, surgeons are
33 the most reluctant to seek support for mental health issues in spite of the symptoms they
34 experience, including burnout and depression.¹⁶ Their unwillingness is closely related to
35 concerns about losing their credibility as doctors and the stigma about seeking help within
36 the medical community. Furthermore, a study by Upton et al. (2012) reported a
37 concerning high rate of burnout across various surgical specialties in the UK. Their
38 study, which surveyed 1,971 surgeons from 127 NHS hospital trusts, found that one-third
39 of the respondents showed high levels of burnout or exhaustion.¹⁷
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46 However, to the best of our knowledge, there has been no study on how surgeons
47 have been affected by the current pandemic. Research is therefore urgently required
48 concerning how the COVID-19 pandemic is affecting the mental health of surgeons to
49 gain a clearer understanding in order to help inform future interventions and support
50 plans.³ Therefore, the current study aimed to ask surgeons directly about the impact of
51 the COVID-19 crisis on their work and home life.
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Methods

Study design and participants

This qualitative study is part of a larger longitudinal online survey investigating surgeon burnout. The larger study included a quantitative survey and a qualitative component, with the quantitative survey focusing on surgeon burnout and general patient care. By contrast, the qualitative component reported in the current paper assessed the impact of the COVID-19 outbreak on surgeons by offering two open-ended questions via the Qualtrics survey tool: 'What challenges is the COVID-19 crisis currently presenting to you in your work and home life?' and 'How is this stress affecting you personally?'

All UK surgeons could participate in the survey, regardless of their specialty or status as trainees or consultants. Anyone outside of these groups were excluded, including retirees. Recruitment to the online survey was conducted between 5th May and 30th June, 2020. Participants were enrolled using convenience and snowball sampling methods. Surgeons and surgical trainees working in various surgical specialties across the UK were invited to participate in the survey using social media channels (e.g., Twitter) and 306 individual surgeons were approached using an available networking email list. The first invitation was sent, then a reminder was sent five days later. Twitter advertising consisted of 10 tweets published at various times with the hashtags 'surgeons, UK', 'NHS' and 'COVID19'. The most recent UK surgeon statistics shows 57,500 surgeons with various specialties.¹⁸ However, due to recruiting via Twitter, we were not able to monitor the response rate of participants. In total, 141 participants took part. Recruitment ceased once it was deemed by the authors that the qualitative data collected provided sufficient 'information power', to address the research questions.¹⁹

This study received ethical approval from the School of Psychology Research Ethics Committee at the University of Leeds on 4th May, 2020 (Ethics Reference No: PSYC-34). All participants were provided with information about the research, and their participation was voluntary.

Patient and public involvement

The development of the questionnaire and the choice of measures used were discussed with surgeons at a training event and feedback was received.

Data Analysis

Data were screened and checked to confirm no participants had matching demographics (e.g., matching age, gender, location and role), preventing multiple entries from single participants.

The data analysis covered qualitative (thematic) and descriptive analysis. Thematic analysis is considered a method that outperforms other methods due to its theoretical flexibility and ability to generate unanticipated insights by providing a detailed account of the data.²⁰ The analysis framework developed by Braun and Clarke (2006)²⁰ includes data familiarisation, initial code generation, theme searching, reviewing, defining and naming, and report production. This method was chosen to highlight similarities and differences across the dataset while generating unanticipated insights into the psychological and occupational effects of COVID-19 pandemic on surgeons. Responses to the first and second questions of the survey were analysed together using thematic analysis.²⁰

The second question, 'How is this stress affecting you personally?' was also analysed following the approach of Taylor et al.²¹, which classified the content nature into four categories: positive, neutral, mildly negative and strongly negative. This allowed us to quantify the percentage of surgeons who felt the pandemic was affecting them negatively. For example, responses such as 'fatalistically' and 'the stress is significantly affecting me badly' were rated as strongly negative; 'not too badly' and 'mild' were deemed mildly negative; "I have achieved a better work-life balance" was considered positive; and "not affected", "able to cope" and "unsure" were categorised as neutral. Two authors (TG) who is PhD candidate of psychology and (DOC) who is professor of psychology, worked independently to analyse the data, minimising subjective coding bias. Any disagreements were resolved by discussion. Inter-rater agreement between coders was good, resulting in a Kappa of 0.91.

Results

Sample characteristics

A total of 141 surgeons completed the survey (31 females, 91 males, 1 other and 18 did not disclose). Of these, 80 (57%) were consultants, 37 (26.5 %) were specialty trainees, 13 (9%) were core surgical trainees, 9 (6.2 %) were others including 2 (1.3%) surgeons did not respond to this question.

Seventy-five (53%) participants were from Urology followed by General Surgery 14 (10%), then 10 (7%) from Trauma and Orthopaedics, 8 (6%) from Neurosurgery, 8 (6%) for Oral and Maxillofacial, 6 (4%) from Gynaecology, 4 (3%) from Obstetrics and Gynaecology, 4 (3%) from Vascular Surgery, 2 (1%) from Plastic Surgery, 2 (1%) from Colorectal, whereas the rest 5 (3.5%) from different specialties which include Hepatobiliary and Transplant Surgery, Oesophagus and Gastric, Ophthalmology, Otorhinolaryngology and Transplant and hepatobiliary surgery, 1 each. While 3 participants did not answer the question (2%). The average age of the participants was 42.2 years (range 26-66 years, SD 10.45). The average number of years practising as a surgeon was 14 years (range 1-37 years, SD 9.7).

The survey found that 121 surgeons (85.8%) reported being negatively affected by the COVID-19 pandemic, of these 11 (7.8%) experienced a strongly negative effect and 110 (78%) described mildly negative impact. In contrast, 8 (12.7%) participants reported a neutral impact of the pandemic, and 2 (1.5%) of the respondents stated a positive effect of COVID-19 pandemic.

Thematic Analysis

The thematic analysis identified four themes. The first theme references changing and challenging work environment as a result of COVID-19 pandemic; the second theme identifies challenges to professional life and development; the third theme recognises managing change and loss in the respondents' personal lives; and the fourth theme highlights emotional and psychological impacts (Table 1). All quotes are provided in supplementary file, appendix 1.

Theme One: Changing and Challenging Work Environment

This theme deals with how most hospitals during COVID-19 crisis have changed their structure, shifts, administration, staffing for COVID-19 cases, operational changes and so on. These responses detail how COVID-19 pandemic has had an impact on the work environment of surgeons.

1) Dealing with Constant Change. These subthemes explain how surgeons cope with constant change through limited capacity for operative surgery and change of work structure.

- **Limited Capacity and Operative Surgery.** This subtheme includes restricted capacity and minimal surgical operations as a result of COVID-19 pandemic. Two surgeons mentioned the changes of the work environment

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2 in terms of limited capacity: “reduced capacity”; “At work ... limited
3 capacity”. Furthermore, many comments mentioned capacity specifically in
4 the context of operative surgery (e.g. “Reduced capacity for operative
5 surgery”).
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- **Change in Work Structure.** Alteration in work structure involves surgeons changing roles, performing work in different ways or modifying work plans. There are many comments about working with unfamiliar environments (e.g., “changing pattern of work and on call”). The other comments mentioned this change by using a new method to communicate with patients by telephone: “New methods of working—including telephone clinics”.

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Some comments mentioned reallocated workers performing work they are unfamiliar with (e.g., “challenge of being asked to contribute to areas that I have not done for years under the pretext that it is covering COVID-19”). Other comments mentioned the changes arising from bad planning by management, such as “Lack of leadership” and “unrealistic planning by the management”. Also, some statements relate to working from home (e.g., “I have had to work from home due to immunosuppressive medication.”)

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By contrast, some respondents see this change as positive, as it makes the work easier (e.g., “opportunity for more home working would be beneficial”).

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2) Workload and Lack of Work-life Balance. An increased workload and a lack of work-life balance are challenges that surgeons face in the work environment during COVID-19 pandemic. Many comments mentioned an increased workload (e.g. “overworking” and “workload post pandemic”). However, many surgeons also mentioned how this workload affects their work-life balance (e.g., “Working more weekends. Different shift pattern than my partner so difficult to maintain a reasonable home life”).

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3) Surgeons Struggling with Personal Protective Equipment (PPE). While working during the COVID-19 pandemic, surgeons faced many problems related to PPE, including a lack of PPE and discomfort associated with wearing PPE. Selected comments mentioned a lack of PPE and that surgeons struggled with and ‘ability to deliver care due to lack of PPE’. This lack might make surgeons feel

1 unsafe in their work, causing anxiety about their safety. Other surgeons struggled
2 PPE causing communication difficulties (e.g., 'Carrying out emergency surgeries
3 with less familiar teams and adapting the ways of communication during the case
4 due to PPE'). Surgeons also spent significantly more time donning and doffing PPE
5 as well as performing infection control at work and upon returning home (e.g., 'on-
6 COVID wards means spending lots of time donning/doffing PPE rather than seeing
7 patients'). Worry, annoyance and time pressure regarding these elements
8 illustrated surgeon struggles with PPE.
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17 ***Theme Two: Challenges to Professional Life and Development***

18 This theme describes how COVID-19 pandemic has affected surgeons'
19 performance at work and their experience of professional development.
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21 **1) Impact on Surgeons' Performance.** Some surgeons commented about
22 difficulties in planning and making decisions (e.g., "It is intellectually tiring to make
23 decisions"). Many also mentioned about how COVID-19 affects their performance
24 by making them less productive and slower at work "Less productive and
25 innovative"; "Work is mundane and slow." In addition to difficulties in planning and
26 lack of productivity, several comments relate to surgeons feeling tired and even
27 exhausted during the period of COVID-19 crisis (e.g., "Tired, often struggle to find
28 motivation").
29

30 **2) Impact on Surgeons' Development.** A number of comments express how
31 COVID19 outbreak affects training (e.g., "Training severely limited" and "Zero
32 access to any training, either in theatre or clinic."). Apart from the lack of training,
33 many surgeons expressed their concern about achieving an Annual Review of
34 Competence Progression (ARCP) "worry about achieving competency for ARCP").
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39 ***Theme Three: Management of Change and Loss in Personal Lives***

40 This theme describes the effects of COVID-19 pandemic on surgeons' lives
41 outside work.
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43 **1) Childcare Issues.** Most remarks about how COVID-19 crisis affects surgeons'
44 lives are about how surgeons struggle with childcare issues (e.g., "Difficult
45 having teenagers at home with school being closed" and "struggled with
46 childcare").
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- 2) **Family life and relationships.** Several participants expressed how, in order to avoid transmission of COVID-19, their communication with their family was affected: “Not being able to live with my wife as having to live near hospital in Travelodge - makes communication harder” and “Not being able to travel and support elderly parents abroad in case they run into problems”.
 - 3) **Cancellation of Life Plans such as Weddings and Honeymoons.** Personal challenges were encountered regarding life plan changes, such as having to cancel honeymoons or weddings, causing surgeons to feel frustrated about a lack of agency or disappointed by unmet expectations. These were illustrated by mentions of life plan changes: ‘Postponement of our wedding’, ‘Wedding, honeymoon and annual leave cancelled’
 - 4) **Reduce Leisure Opportunity.** In addition, reduced leisure opportunities were mentioned (e.g., “travel. The pub is shut and I can’t go on holiday” and “Home life - still seem to be working stressful days but little to no balance with sports or leisure, so life seems fairly imbalanced”. By contrast, one comment mentioned the increased leisure opportunities: “Less work, more family time, and more golf!”
 - 5) **Poor Sleep.** Eight statements expressed participants’ struggles with poor sleep. These included quality of sleep and lack of sleep (e.g., “Strange dreams!” and “struggling to sleep sometimes”).

Theme Four: Emotional and Psychological Impact

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This theme describes psychological and emotional effects during the COVID-19 pandemic.

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- 1) **Fear and Anxiety.** Surgeons’ fear and anxiety about the disease and bringing the virus home was raised numerous times. Many comments describe feeling of fear, for example: “fear of bringing the virus home and infecting my family and my mother in law with lung cancer” and feeling “Anxious about bringing the virus home”.

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Concern about Patients and Work. This refers to surgeons’ concerns about being responsible for their patients and work: “I am concerned about the impact on non-cancer patients, particularly neuropathic patients” and “Feeling pressure to find patients with cancer and enable them to have the care they need with the current limited system”.

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Anticipatory Anxiety and Uncertainty. This category relates to many comments that expressed surgeons' concerns about the future and uncertainty (e.g., "feeling of anticipation of things getting worse" and "What will my job look like in the coming months/years and how will I be able to arrange family commitments/childcare around this").

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- 2) **Loss of Motivation.** Feeling bored and having decreased motivation levels at work is considered one of the emotional impacts of COVID-19 pandemic: "Decreased motivation at work" and "Tired, often struggling to find motivation".
 - 3) **Low Mood.** Participants reported having low moods during COVID-19 crisis, including feeling irritable (e.g., "very much, started having irritability [sic]" and "anger". Participants also expressed feeling unsettled ("Feel more unsettled than usual") or even becoming more emotional ("Makes me a lot more emotional than I have ever been") or feeling hopeless and annoyed: "Feeling hopeless"). One participant expressed a feeling of giving up and feeling unable to adapt: "I try to cope. Sometimes I feel that I am gonna give up."
From the opposite side, some surgeons mentioned they are adapting to this current situation: "New way of life requiring rapid adaptation" and "adapting to work and out of work life".
 - 4) **Stress and Burnout.** Stress and burnout were also considered some of the key emotional and psychological effects of COVID-19 pandemic. Several comments mentioned "I feel burned out" and "Very stressed at the start of the pandemic over catching COVID". However, one remark shows the opposite and mentioned this time during COVID-19 crisis is less stressful: "I don't feel more stressed. Maybe even less"

45 Discussion

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This study aimed to understand the professional and personal effects of the COVID-19 pandemic on practicing surgeons. It found that 8 out of 10 surgeons reported that they were negatively affected by COVID-19 outbreak, with many respondents highlighting the increased challenges of their work environment. Respondents also emphasised the need to manage change in their professional and personal lives. Finally, the results of this study underscore the substantial emotional and psychological effects of COVID-19 pandemic on surgeons' mental health, particularly in relation to fear and anxiety, loss of motivation, low mood, stress and burnout. These findings are important

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2 because the demands of the surgical aspects of healthcare are different to other medical
3 specialities, therefore, they call for different approaches to support surgeons.
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6 The qualitative analysis of surgeons' comments revealed the changing and
7 challenging work environments resulting from COVID-19 pandemic, including surgeons'
8 worries about the delay and cancellation of planned operations. The consistency of the
9 working in hospital settings has drastically changed due to the pandemic; COVID-19
10 cases have been prioritised because of their urgency. This is bound to disturb the
11 standard operating procedures in surgical cases and cause complications and untimely
12 responses to patients, while even inducing unwanted stress in surgeons. This is in
13 accordance with Soreide et al., who found that the COVID-19 emergency can affect the
14 long-term delivery of surgical services and lead to cancellations and delays.²² Similarly,
15 Chadi et al. found that almost 27% of respondents mentioned interruptions in the delivery
16 of surgical services.²³
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26 Limited PPE was also one of the major challenges surgeons reported facing during
27 the pandemic. We found that shortages of PPE negatively impacted surgeons, making
28 them fearful and anxious about their own safety and the safety of their patients and their
29 families. This result is similar to findings reported in a study by Jessop et al. (2020), which
30 found that the lack of PPE combined with changing and unclear structures in the work
31 environment resulted in confusion and anxiety for healthcare staff.¹³ In the hospital
32 setting, administrators and healthcare teams should have already set up standard
33 guidelines to follow for effective operations that include adequate precautions in response
34 to potential pandemics, which are vital since surgical operations are highly invasive and
35 pose greater risks for both patients and surgeons.²⁴ If these guidelines are properly
36 followed, surgeries are still expected to proceed, even in the midst of the pandemic, and
37 minimal cancellations due to risk of infection will be expected, all of which will improve the
38 working conditions for surgical teams. Consideration must also be given to surgeons who
39 have high-risk family members, such as elderly relatives, children and even other
40 healthcare workers, all of which may contribute to higher levels of anxiety for surgeons
41 themselves.²⁵
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55 The second and third themes to emerge from this study relate to the challenges to
56 surgeons' personal and professional lives and their development during the COVID-19
57 pandemic. From the perspective of training practitioners, adjustments to educational
58 programs in response to this unexpected interruption should be put into place to minimize
59 the disruption of the continuity of learning. In light of this, a lack of training is one of the
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1 main aspects of this theme that affects surgeons negatively. This result is consistent with
2 a previous study of surgeons in Italy, which found that the COVID-19 pandemic had a
3 negative impact on their educational programme, which includes a training component.²⁶
4 Furthermore, 80% of surgeons who participated in a survey in India reported that their
5 learning had been adversely affected by COVID-19 pandemic.²⁷ Hence, training hospitals
6 should take this into consideration and reassure trainees. This study has implications for
7 future research to formulate clear guidelines that compensate for cancelled training
8 courses and lost time, which might help mitigate the stress currently experienced by
9 surgeons and inform them how to reschedule training. This study also recommends virtual
10 and simulation-based training during a pandemic. While surgeon training courses may
11 require physical attendance due to their complexity, trainers should consider alternative
12 methods (webinars and immersive technologies) to facilitate surgical training. Such
13 adaptations have been universally tested as remote learning methods and have been
14 deemed increasingly effective, even in the niche area of surgery.²⁸ In lieu of lost
15 opportunities to experience in-hospital training, virtual programs must be supplemented
16 by in-hospital simulated skill training.

17 Besides the training setting, personal and psychosocial needs are also expected
18 to be part of surgeons' coping strategies. Proper scheduling of hospital duties will allow
19 surgeons to have quality time for their families and themselves, allowing recovery from
20 the demands of work.²⁹ Knowing the adaptations currently practiced by surgeons that
21 have been shown to be effective should be discussed further so that these coping
22 mechanisms can be disseminated throughout the surgical community and help
23 administrators and managers foster better adaptations within their institutions.

24 The fourth theme that emerged from this study relates to the management of
25 change and loss in the respondents' personal lives and to the emotional and
26 psychological impacts surgeons are experiencing during COVID-19 pandemic. The
27 current findings are consistent with those of Li et al. (2020), who found that COVID-19
28 pandemic negatively affected mental health because of the special precautions required
29 that may affect effective communication, personal contact and overall interaction, all of
30 which are vital components of healthy psychosocial well-being.⁶ The personal and
31 psychosocial effects of working through the pandemic on surgeons must not be
32 disregarded as they can affect their quality of work and the success of their interventions.
33 Moreover, there is growing evidence to show that job strain, burnout and low wellbeing
34 are associated with poor patient safety and medical errors.³⁰ In addition, such impacts
35 may create long-term complications in surgeons' well-being that can affect them even

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2 after the pandemic subsides. A study by Lu et al. (2020) reported that frontline medical
3 staff suffered more from fear, anxiety and depression than they did before the COVID-19
4 pandemic.³¹ Focusing on frontline healthcare professionals, a study by Wang et al. (2020)
5 discovered many suffering from acute stress disorder, with a high prevalence of anxiety
6 and depression.⁷ Evidently, the additional challenges of working in a clinical setting have
7 already contributed to high levels of mental distress in healthcare workers. Three recent
8 studies have shown that healthcare staff working with COVID-19 patients are
9 experiencing very high levels of anxiety and depression.^{32,33,34} Furthermore, the current
10 findings also support Wu et al.'s (2020) results that have shown that COVID-19 pandemic
11 has had a significant impact on health workers' worries about infection and their families,
12 as well as on their sleep quality.³⁵ With deteriorating mental health, it is likely that the
13 effectiveness of each healthcare worker is compromised and this may impact on their
14 well-being for an extended period of time.

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25 The current study has a number of limitations, including the fact that two open-
26 ended questions may not provide sufficient insight into surgeon mental health, limiting
27 descriptions to one aspect of how COVID-19 pandemic affected them (e.g., how working
28 during the pandemic affected their families). We could also have conducted semi-
29 structured interviews to gain a deeper understanding of pandemic-related problems.
30 However, we felt it unreasonable to ask surgeons to participate in such detailed interviews
31 during these stressful times, when surgeons are already under immense pressure.
32 Nevertheless, it is important to note that the thematic analysis provided a broad range of
33 responses, yielding a rich dataset.

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40 Another limitation relates to the fact that we were not able to monitor our response
41 rate and as such it is not possible to know whether our sample reflected the wider
42 population of UK surgeons from which it was recruited. In addition, this study required
43 surgeons to self-report their wellbeing and the challenges they had experienced. As
44 surgeons are reluctant to share emotional distress and seek support¹⁶, this might have
45 caused participants to avoid providing in-depth information about their COVID-19
46 pandemic struggles. If feasible, future studies ought to include other more objective
47 evaluations of mental health (e.g., clinical interviews) and investigate the reasons why
48 surgeons are less likely to seek support and to discuss issues relating to their own mental
49 health.

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60 The aforementioned limitations notwithstanding, the current study also has several
strengths. First, the results may have broader implications for fully understanding and

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2 being aware of the psychological and occupational effects of COVID-19 pandemic on UK
3 surgeons. The study findings may encourage other researchers to investigate the
4 psychosocial effects of the pandemic on the working practices of surgeons and explore
5 resolutions that would improve their working conditions. Furthermore, this study
6 encompasses surgeons from different specialties, regions and grades, which provided a
7 broad overview of how surgeons deal with difficulties, as well as an understanding of their
8 fears and emotional and psychological problems during COVID-19 pandemic. In addition,
9 it was clear that each subspecialty and demographic group had its own challenges that
10 can be brought to light, especially ones usually missed by other studies. In addition, this
11 study used thematic analysis, which is considered a flexible method to identify themes
12 based on participants' answers.
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21 In conclusion, this study found that over 80% of surgeons who responded reported
22 being negatively affected by the COVID-19 pandemic, with many respondents
23 highlighting increased challenges in their work environments. Respondents also
24 emphasised a need to manage change in their professional and personal lives,
25 highlighting the substantial emotional and psychological effects of the COVID-19
26 pandemic on surgeon mental health (e.g., fear and anxiety, loss of motivation, low mood,
27 stress and burnout). There is an urgent need for workplace support and mental health
28 intervention to help surgeons cope with the difficulties they face during the ongoing
29 COVID-19 pandemic.
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37 **Authors' contributions:**

38 T.G., J.J., CSB and DOC were responsible for designing and implementing the research,
39 analysing the results and the writing of the manuscript.
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42 **COMPETING INTEREST**

43 The authors declare that they have no conflict of interest.
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46 **Patient consent for publication**

47 Not required
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53 collect data.
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Data availability statement

All data relevant to the study included in the article or uploaded as supplementary information

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Table 1. Themes, descriptions, subthemes, example

Themes	Descriptions	Subthemes	Example
Changing and challenging work environment	Most hospitals during COVID-19 have changed their structure, including shifts, administrative staffing for COVID-19 cases, operational changes and so on. These responses detail how COVID-19 has affected the work environment of surgeons.	1) Dealing with constant change <ul style="list-style-type: none"> ● Limited capacity ● Change in work structure 2) Increased workload and lack of work-life balance 3) Surgeons struggling with Personal Protective Equipment (PPE)	"Reduced capacity for operative surgery" "changing pattern of work and on call" "increased work load" "Lack of PPE"; "PPE makes it difficult for patients to hear you and see your non-verbal response"
Challenges to professional life and development	This theme describes how COVID-19 has affected surgeons' performance at work and their experience of professional development.	1) Impact on surgeon's performance <ul style="list-style-type: none"> ● Difficult to make decisions ● Less productive/Work slow ● Tired 2) Impact on surgeon's development	"It is intellectually tiring to make decisions" "not being able to do my job adequately" "Make me feel tired" "Zero access to any training, either in theatre or clinic"
Management of change and loss in personal lives	This theme describes the effects of COVID-19 on surgeons' lives outside work.	1) Childcare issues 2) Family life /relationship 3) Having to cancel honeymoons/weddings 4) Reduced leisure opportunities 5) Poor sleep	"Children off school—childcare challenges because both of us are key workers and school provision does not have options before and after school care" "loss of communication with wife" "Wedding, honeymoon and annual leave cancelled" "Travel. The pub is shut and I can't go on holiday" "Some sleeplessness"

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Emotional and psychological impacts	This theme describes psychological and emotional conflict during COVID-19	<p>Fears and anxiety</p> <p>Loss of motivation and feeling bored</p> <p>Low mood</p> <p>Stress and burnout</p>	<p>“fear of bringing virus home and infect[ing] my family and my mother in law with lung cancer”;</p> <p>“Increased anxiety about the future”</p> <p>“often struggle to find motivation”; “boredom”</p> <p>“very much, started having irritability”; “Feeling hopeless”</p> <p>“Very stressful both at home and work”; “burnout”</p>
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Themes and associated responses

Theme	Responses
<p>Limited capacity for surgery</p>	<p><i>"reduced capacity"</i></p> <p><i>" At work,,, limited capacity"</i></p> <p><i>"Reduced capacity for operative surgery"</i></p> <p><i>"unable to operate as much, waiting lists increasing"</i></p> <p><i>"inability to carry out surgery"</i></p> <p><i>lack of operating"</i></p> <p><i>"Not being able to do my job as before, e.g. operating to same degree"</i></p> <p><i>"Minimal operating"</i></p> <p><i>"no operating time "</i></p> <p><i>"Limited operating due to elective lists being cancelled"</i></p> <p><i>" reduced elective operating".</i></p> <p><i>"Less operating time"</i></p> <p><i>"less operating"</i></p> <p><i>"Less operating!"</i></p>
<ul style="list-style-type: none"> Change the work structure 	<p><i>"Change in working structure"</i></p> <p><i>"Constant change"</i></p> <p><i>"working out of normal environment"</i></p> <p><i>"changing pattern of work and on call"</i></p> <p><i>"Multiple changes every week. Hard to keep some semblance of continuity"</i></p> <p><i>"Changed job which is very stressful."</i></p> <p><i>"New way of life requiring rapid adaptation."</i></p> <p><i>"New type of work"</i></p> <p><i>"Working in unfamiliar environment"</i></p> <p><i>"Unusual work patterns"</i></p> <p><i>"changes to work pattern".</i></p> <p><i>"Disruption to routine"</i></p> <p><i>"New methods of working- including telephone clinics"</i></p>

	<p><i>"I've been deployed to telephone patients referred as suspected cancers".</i></p> <p><i>"Mostly virtual clinics, and taking decisions on 2wk cancer referrals without direct examination of patients."</i></p> <p><i>"challenge of being asked to contribute to areas that I have not done for years under the pretext that it is covering COVID-19"</i></p> <p><i>"Carrying out emergency surgeries with less familiar teams "</i></p> <p><i>" I work in cancer surgery and many of my team have been reallocated yet the service has continued"</i></p> <p><i>"trauma and anxiety of potentially being forced to do things that I am not practiced at currently and so patient safety and incidents."</i></p> <p><i>"Lack of leadership"</i></p> <p><i>" unrealistic planning by the management."</i></p> <p><i>"the inefficiency of the system and uber managerial approach which makes everyone lazy and slower than before"</i></p> <p><i>"Day to day work not really matching job plan"</i></p> <p><i>"there are no facilities to rest during on calls"</i></p> <p><i>"I have had to work from home due to immunosuppressive medication."</i></p> <p><i>"Academic work from home difficult with very young children"</i></p> <p><i>"Research affected as lab closed"</i></p> <p><i>"Significant changes to working practice with more involvement with management and service delivery as a trainee"</i></p> <p><i>"Opportunity for more home working would be beneficial"</i></p> <p><i>"increased time at home, increased time for audit/research"</i></p> <p><i>"better work life balance"</i></p> <p><i>"More logistics".</i></p>
<p>2-Increased workload and Lack of work-life balance</p>	<p><i>"overworking"</i></p> <p><i>"increased work load"</i></p> <p><i>"Very long turnover between patients (surgery)."</i></p> <p><i>"increased on call"</i></p>

	<p><i>"Changed job which is very stressful"</i></p> <p><i>" More on calls"</i></p> <p><i>"due to increase in number of on calls"</i></p> <p><i>"workload post pandemic"</i></p> <p><i>" stress at work"</i></p> <p><i>"Working more weekends/OOH. Different shift pattern than my partner so difficult to maintain a reasonable home life"</i></p> <p><i>"Significant interruption to home life and plans."</i></p> <p><i>"Disruption in training and work life"</i></p> <p><i>" lack of clarity in job role and increased work pressure meaning more stress and fatigue"</i></p> <p><i>"Struggling to manage work life balance"</i></p> <p><i>"My wife and I are both doctors, so work/life balance is hard due to COVID"</i></p> <p><i>"no job satisfaction"</i></p> <p><i>"Extending into personal time and out of work life".</i></p>
<p>3-Surgeons struggling with Personal Protective Equipment</p>	<p><i>"ability to deliver care due to lack of PPE"</i></p> <p><i>"lack of PPE".</i></p> <p><i>"I cannot go on too long operating with PPE. Neck hurts. It's just living hell."</i></p> <p><i>"PPE makes it difficult for patients to hear you and see your non-verbal response"</i></p> <p><i>"Carrying out emergency surgeries with less familiar teams and adapting the ways of communication during the case due to PPE"</i></p> <p><i>"non-covid wards means spending lots of time donning / doffing PPE rather than seeing patients"</i></p> <p><i>"additional time needed for all tasks from hand washing, to donning and doffing, to hygiene measures on entering home from work to ensure family members are not affected"</i></p> <p><i>"infection control measures both at work and home".</i></p>
<p>Impact on surgeon performance</p>	<p><i>"Difficult to plan and do things."</i></p>

<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30</p> <p>include (Hard to make decisions, Less productive/Work slow and Tired)</p>	<p><i>"It is intellectually tiring to make decisions"</i></p> <p><i>"Potential for making the wrong decision leading to adverse outcomes for patients"</i></p> <p><i>"Less productive and innovative"</i></p> <p><i>"Work is mundane and slow."</i></p> <p><i>"Lack of work productivity can be frustrating"</i></p> <p><i>"not being able to do my job adequately".</i></p> <p><i>"Not able to work as much as usual"</i></p> <p><i>"the inefficiency of the system and uber managerial approach which makes everyone lazy and slower than before"</i></p> <p><i>"tired"</i></p> <p><i>"Tired and not sleeping well"</i></p> <p><i>"Feel more tired and worn out."</i></p> <p><i>"More tired"</i></p> <p><i>"Tired, often struggle to find motivation"</i></p> <p><i>"Tiring"</i></p>
<p>31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60</p> <p>2-Impact on surgeon's experience/development These include Training Programme Directors (TPDs) or achieving An Annual Review of Competence Progression (ARCP)</p>	<p><i>"Training severely limited"</i></p> <p><i>"Disruption in training"</i></p> <p><i>"Worry about training"</i></p> <p><i>"impact on training"</i></p> <p><i>"Decimation of training opportunities."</i></p> <p><i>"lack of training "</i></p> <p><i>"Training largely ceased despite remaining in specialty and with the need for operating off site loss of consultant support and supervision"</i></p> <p><i>"There is almost no training"</i></p> <p><i>"Zero access to any training, either in theatre or clinic."</i></p> <p><i>"Disrupting training"</i></p> <p><i>"No training"</i></p> <p><i>"Reduced training opportunities."</i></p> <p><i>"Loss of learning opportunities"</i></p> <p><i>"Training opportunities reduced"</i></p>

	<p><i>"TPD still wants us to show progression in specialty despite significantly reduced elective work"</i></p> <p><i>"worry about achieving competency for ARCP"</i></p> <p><i>"The stress is mostly with the unknown of ARCP outcomes".</i></p> <p><i>"The ARCP outcomes due to covid-19 have been poorly thought out and will be poorly executed to the detriment of trainees."</i></p>
1-Childcare issues	<p><i>"Childcare issues"</i></p> <p><i>"Childcare is a huge problem."</i></p> <p><i>"Difficult having teenagers at home with school being closed"</i></p> <p><i>"Childcare issues with nursery closing just before return"</i></p> <p><i>"struggled with child care."</i></p> <p><i>"Making difficult planning to pick up children"</i></p> <p><i>"tensions with adult children who have returned home"</i></p> <p><i>"Children off school and wife having to juggle her job / childcare and home schooling. Trying to ensure I'm home as much as possible. "</i></p> <p><i>"Childcare"</i></p> <p><i>"Childcare "</i></p> <p><i>"My boys aged 15 and 12 are missing school and I am worried about them "</i></p> <p><i>" Children off school-childcare challenges because both of us are key workers and school provision does not have options before and after school care"</i></p> <p><i>"Child care with schools being closed"</i></p> <p><i>"Home situation can also be very stressful with kids at home so I feel I am dealing with stress at home and stress at work."</i></p> <p><i>"Childcare (husband was admitted to hospital and I needed to take parental leave) and eldest child very anxious about the pandemic"</i></p> <p><i>"more emotional support for children at home"</i></p>
2-Family life/ Relationship	<p><i>"Not being able to live with my wife as having to live near hospital in travel lodge - makes communication harder"</i></p>

	<p><i>"Fear of taking virus home to family. Fear from partner that I will bring the virus home."</i></p> <p><i>"infecting loved one"</i></p> <p><i>"all I am doing is looking after hospital inpatients. I live alone, my partner is in another deanery, and I've not seen her since it started."</i></p> <p><i>"Not being able to travel and support elderly parents abroad in case they run into problems"</i></p> <p><i>"Stressful regarding concerns of family wellbeing due to my work."</i></p> <p><i>"Significantly as a BAME member who has a vulnerable adult at home"</i></p> <p><i>"Cannot visit my family"</i></p> <p><i>"Less social events"</i></p> <p><i>"lack of family support as they live out of area and unable to visit on time off."</i></p> <p><i>"wife anxious/furloughed"</i></p> <p><i>"loss of communication with wife. "</i></p> <p><i>"I'm worried as both my husband and I are doctors. And also the hassle of staying in hospital for on calls as I live far away."</i></p> <p><i>"Reduced social activities"</i></p> <p><i>"less time to socialise"</i></p> <p><i>"Less time spent with friends "</i></p> <p><i>"Unable to see family and friends"</i></p> <p><i>"Because of the travel restrictions and the fact that I work away from home, I have not been home for three months"</i></p> <p><i>"Cannot meet friends"</i></p>
3-Having to cancel honeymoons/wedding	<p><i>"Postponement of our wedding"</i></p> <p><i>"Wedding, honeymoon and annual leave cancelled".</i></p>
Reduced leisure opportunities	<p><i>"travel. The pub is shut and I can't go on holiday"</i></p>

	<p><i>" Home life - still seem to be working stressful days but little to no balance with sports or leisure, so life seems fairly imbalanced"</i></p> <p><i>"Not getting enough exercise. Socializing is nonexistent."</i></p> <p><i>"Reduced social activities"</i></p> <p><i>"Less work, more family time, more golf!"</i></p>
5-Poor sleep	<p><i>"Some sleeplessness"</i></p> <p><i>" Strange dreams!"</i></p> <p><i>"Poor sleep"</i></p> <p><i>"not sleeping well"</i></p> <p><i>"Occasional difficulty sleep"</i></p> <p><i>"not sleeping"</i></p> <p><i>"struggling to sleep sometimes"</i></p> <p><i>"Less sleep"</i></p>
<i>Fears and anxiety</i>	<p><i>"Feeling unsafe when seeing positive patients"</i></p> <p><i>"fear of bringing virus home and infect my family and my mother in law with lung cancer."</i></p> <p><i>"Concerns over taking the virus home to my vulnerable wife who is pregnant with 3rd trimester complications. This is the most stressful component of the situation."</i></p> <p><i>"Not to bring the virus to my family"</i></p> <p><i>"Exposure to family via me - biggest challenge"</i></p> <p><i>"concerns over personal safety"</i></p> <p><i>"the risk of contracting covid"</i></p> <p><i>"bringing it home"</i></p> <p><i>"Anxious about bringing the virus home"</i></p> <p><i>"anxiety about safety"</i></p> <p><i>"Anxiety about catching covid and passing on to family"</i></p> <p><i>"Worry about my family"</i></p> <p><i>"Anxiety"</i></p> <p><i>"causing severe anxiety"</i></p> <p><i>"Felt more worried about life"</i></p> <p><i>"Slight worry about getting infection."</i></p> <p><i>"Constant worry about not missing diagnosis and personal risk"</i></p>

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4	<i>"The worry about cartying the virus home doesnt stop."</i>
5	<i>"I am concerned about the impact on non cancer patients,</i>
6	<i>particularly neuropathic patients"</i>
7	<i>"feeling of work piling up that has been deferred"</i>
8	<i>"suffering due to delayed treatment"</i>
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10	<i>"Feeling pressure to find patients with cancer and enable them</i>
11	<i>to have the care they need with the current limited system"</i>
12	<i>"decisions to postpone treatment if not urgent"</i>
13	<i>"very few patients are getting treatment in a timely manner. "</i>
14	<i>"Limited operating due to elective lists being cancelled"</i>
15	<i>"concern about patients and trainees and how we will manage</i>
16	<i>both groups going forward"</i>
17	<i>"Difficulty managing risk for patients who one cannot see"</i>
18	<i>"Feel very frustrated regarding the unnecessary negative impact</i>
19	<i>some of these policies are having on patients (without the option</i>
20	<i>to bend the rules as no two situations are the same)!"</i>
21	<i>"it is frustrating to see patients suffer "</i>
22	<i>"Protect myself and my patients."</i>
23	<i>"Unsettling in terms on impact on patient"</i>
24	<i>"Inability to carry out cancer diagnostic work. We are storing up</i>
25	<i>major trouble here."</i>
26	<i>"Worry about delayed diagnosis for my patients and resultant</i>
27	<i>litigation that may follow"</i>
28	<i>"Unable to provide care to patients with benign conditions."</i>
29	<i>"Not being able to see my patients or offer my hand when</i>
30	<i>needed while breaking bad news"</i>
31	<i>"Constant worry about not missing diagnosis".</i>
32	<i>"feeling of anticipation of things getting worse"</i>
33	<i>"Concerns What will my job look like in the coming months/</i>
34	<i>years and how will I be able to arrange family commitments/</i>
35	<i>childcare around this"</i>
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	<p><i>"Worried about uncertainties (short and long term)- second wave of infection, economic aspects and whether we will be able to travel home to see our parents and extended family"</i></p> <p><i>"concern about patients and trainees and how we will manage both groups going forward"</i></p> <p><i>" Increased anxiety about the future"</i></p> <p><i>"Fear of unknown"</i></p> <p><i>"Uncertainty is unnerving"</i></p> <p><i>"Added stress and uncertainty".</i></p>
Loss of motivation and feeling bored	<p><i>"Unable to do usual enjoyable tasks at work. "</i></p> <p><i>"Decreased motivation at work."</i></p> <p><i>"Boredom"</i></p> <p><i>"Loss of enthusiasm"</i></p> <p><i>"Feeling of boredom and lack of enthusiasm at times"</i></p> <p><i>"each day very similar "</i></p> <p><i>"Less productive and innovative as less motivation at work",</i></p> <p><i>"boredom"</i></p> <p><i>"though boredom is creeping in this past week (may 10)", "Bored at home"</i></p> <p><i>"Tired, often struggle to find motivation".</i></p> <p><i>"Boredom at work, frustration of not being able to get on with treating our orthopaedic patients"</i></p> <p><i>"Getting bored of mundane jobs"</i></p> <p><i>"I feel more tired and irritable than usual"</i></p> <p><i>"Feel very frustrated!"</i></p> <p><i>"frustration, irritability"</i></p> <p><i>"it is frustrating to see patients suffer "</i></p>
Low mood	<p><i>"very much, started having irritability"</i></p> <p><i>"I feel more irritable than usual"</i></p> <p><i>"anger"</i></p> <p><i>"A bit angry and short tempered at work".</i></p> <p><i>"irritable "</i></p> <p><i>"Agitated"</i></p>

	<p><i>"Feel irritable at home"</i></p> <p><i>"Feel more unsettled than usual".</i></p> <p><i>"Makes me a lot more emotional than I have ever been."</i></p> <p><i>"Chaos"</i></p> <p><i>"Feeling hopeless "</i></p> <p><i>"Annoying"</i></p> <p><i>"Feel lonely at times"</i></p> <p><i>"depressed at times"</i></p> <p><i>"Depression"</i></p> <p><i>"Depressed most of the time"</i></p> <p><i>"I try to cope. Sometimes I feel that I am gonna give up."</i></p> <p><i>"Coping at present but reduced leisure opportunities mean less ability to de-stress and unwind"</i></p> <p><i>"not really as i have adapted"</i></p> <p><i>"New way of life requiring rapid adaptation."</i></p> <p><i>"Reduced social activities and ability to unwind from work stress"</i></p> <p><i>"Adapting to constantly evolving policies"</i></p> <p><i>"adapting to work and out of work life"</i></p> <p><i>"Feel lonely at times"</i></p>
Stress and burnout	<p><i>"working is more stressful than normal"</i></p> <p><i>"burnout"</i></p> <p><i>"Increased stress"</i></p> <p><i>"Stress"</i></p> <p><i>"Feeling slightly more stressed"</i></p> <p><i>"Stress about extra waiting list and work pressure when we return to normal work causing severe anxiety"</i></p> <p><i>"I feel burned out."</i></p> <p><i>"Added stress"</i></p> <p><i>"Very stressed at the start of the pandemic over catching covid"</i></p> <p><i>"Very stressful both at home and work".</i></p> <p><i>"Increased stress related to work not getting done"</i></p>

	<p><i>"added stress"</i></p> <p><i>"I have stress that comes home with me"</i></p> <p><i>"I don't feel more stressed. Maybe even less"</i></p>
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Standards for Reporting Qualitative Research (SRQR)*

<http://www.equator-network.org/reporting-guidelines/srqr/>

Page/line no(s).

Title and abstract

<p>Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended</p>	<p>Page 1/line 1</p>
<p>Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions</p>	<p>Page 2</p>

Introduction

<p>Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement</p>	<p>Page 5/line120</p>
<p>Purpose or research question - Purpose of the study and specific objectives or questions</p>	<p>Page 5/line124</p>

Methods

<p>Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**</p>	<p>Page 7/line 165</p>
<p>Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability</p>	<p>Page 7/line182</p>
<p>Context - Setting/site and salient contextual factors; rationale**</p>	<p>Page 6 Line136</p>
<p>Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**</p>	<p>Page 6/line 139</p>
<p>Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues</p>	<p>Page 6/line 150</p>
<p>Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**</p>	<p>Page 6/line138</p>

1 2 3 4 5	Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Page6;/line 140
6 7 8	Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	Page 7/line 189
9 10 11 12	Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Page 7/Line13-24
13 14 15 16	Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	Page 6/line 161
17 18 19 20	Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	Page 7/line182

Results/findings

23 24 25 26	Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Page 8/203
27 28 29	Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Table1/page 20

Discussion

32 33 34 35 36 37 38	Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Page 13
39 40	Limitations - Trustworthiness and limitations of findings	Page14/line 441

Other

43 44 45	Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Page 16/line 487
46 47 48	Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Page 16/line496

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

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**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388

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