

**Surgeon Burnout, Patient Safety and Quality of Care:  
Contributors, Consequences and Possible Solutions**

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Submitted in accordance with the requirements for the degree of  
PhD.

The University of Leeds  
School of Psychology

February 2022

The candidate confirms that the work submitted is her own, except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others.

**The four studies of this thesis have been published, and two are under review:**

Al-Ghunaim, T. A., Johnson, J., Biyani, C. S., Alshahrani, K. M., Dunning, A., & O'Connor, D. B. (2021). Surgeon burnout, impact on patient safety and professionalism: A systematic review and meta-analysis. *The American Journal of Surgery*, 224(1 Pt A):228-238.

Al-Ghunaim, T., Johnson, J., Biyani, C. S., & O'Connor, D. B. (2022). Burnout in surgeons: A qualitative investigation into contributors and potential solutions. *International Journal of Surgery*, 101, 106613.

Al-Ghunaim, T., Johnson, J., Biyani, C. S., & O'Connor, D. B. (2022). How UK surgeons experience burnout and the link between burnout and patient care: A qualitative investigation. *Scottish Medical Journal*, 67(4), 197-206.

Al-Ghunaim, T. A., Johnson, J., Biyani, C. S., & O'Connor, D. (2021). Psychological and occupational impact of the COVID-19 pandemic on UK surgeons: a qualitative investigation. *BMJ open*, 11(4), e045699.

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J.J., CSB and DOC were responsible for supervising me in designing and implementing the research, analysing the results, and writing the manuscript.

A.D helped with 10% of abstract screening and full-text screening (Chapter 2/Study1).

K.S. helped with 10% of data extraction and quality assessment (Chapter 2/Study1).

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## **Acknowledgements**

First, I would like to express my gratitude to my encouraging, kind supervisor, Judith Johnson, who has taught me a lot and has been there for me during the entire PhD process. She helped to make it both an enlightening and pleasant journey. Likewise, Daryl O'Connor was a wonderful guide and very helpful, and enabled me to feel like I am a powerful person, and also wish to thank Shekhar Biyani who acted as facilitator, monitor and supporter. I am very fortunate to have had a supervisor as helpful as him. Thank you all, you made the PhD journey a pleasurable experience.

In addition, I want to extend my gratitude to my family. My father, Abdulaziz Al-Ghunaim, supported me by continuously visiting me, standing by my side, and always putting me first. My mother, Munirah Alsuwaylim, has instilled a sense of self-confidence and kindness throughout my life, and has never stopped believing in me. To my great siblings, Mohammed, May, Abdullah, and Noor, thank you for always being there for me and pushing me to do my best. I am grateful for the support they have given me, and I am lucky to have them as family.

When I was away from home, my friends became like a second family. Without their help, I would not have been able to get to this point with as much joy and passion and with so many unforgettable memories that have enabled me to enjoy my life and create a sense of belonging here.

I am also grateful to my native nation of Saudi Arabia for sponsoring my PhD study and I want to thank the University of Leeds for the wonderful team and supervisors provided for me.

Finally, I want to express my gratitude to the surgeons who participated in these research studies for giving me their time and effort. Thanks especially to the surgical training programme manager, Joanne Johnson, for supporting the data collection.

## **Abstract**

Research has linked increased staff burnout to poorer patient safety in healthcare settings. Surgeons, in particular, are more inclined to suffer from burnout whereas surgeons often suffer silently when they are experiencing stress and burnout and do not ask for help which make the issue not clear. There needs to be more research on surgeon burnout, how it affects them and how to enhance their well-being. This thesis aimed to improve understanding of surgeon burnout and identify potential solutions.

This thesis reports five studies. The first was a systematic review and meta-analysis which aimed to investigate the association between surgeon burnout and 1) patient safety and 2) surgical professionalism. The results of a systematic review provided important insights into the existing evidence base on surgeon's burnout and identified gaps in knowledge, one of which is that there is not enough qualitative study to give a deep understanding of how surgeons experience and deal with burnout. Hence, the next two studies used semi-structured interviews to explore the main factors that lead to surgeon burnout and to examine how surgeons cope with burnout at work (Study 2) and to understand how burnout affects surgeons and the care they provide (Study 3). The systematic review also revealed that there is no evidence regarding the link between surgeon burnout and patient safety in the UK, to address this, the fourth study used questionnaire survey methods to investigate the association between surgeon burnout and patient safety outcomes. This study also tested whether surgeons' burnout levels varied over the first six months of the COVID-19 pandemic. The fifth study, .. / qualitative methods, investigated the effects of the COVID-19 pandemic on surgeons' mental health.

## **Key findings**

This thesis found a significant link between surgeon burnout and patient care. The systematic review and meta-analysis (Study 1) results showed that burnout was associated with a 2.5-fold increased risk of medical error. Study 3 identified four themes about how burnout affects patient care: first, burnout weakens surgeon–patient relationships; second, burnout affects patient safety; third, burnout hurts staff relationships; and fourth, burnout makes

surgeons less motivated to improve. Burnout was also associated with patient safety in the survey study (Study 4), and the longitudinal findings indicated a bi-directional connection between burnout and patient safety perceptions (Study 4).

Regarding the main factors that can lead to burnout in surgeons, the thematic analysis identified several factors captured in the following themes: rising to the challenge of surgical work; interpersonal conflict at work; greater demands than resources; the challenge of work-life balance; and the devastating impact of errors and poor patient outcomes (Study 2). The analyses also revealed various strategies surgeons employed to cope with burnout: cognitive restructuring; seeking social support; stepping aside or down from the job; and prioritising personal health. Additionally, some surgeons also reported using maladaptive coping (Study 2). A second qualitative analysis also found three themes in surgeons' experiences of burnout: first, burnout is common but frequently not recognised nor understood; second, burnout is a personal crisis; and third, burnout creates vulnerability at work (Study 3).

The impact of the COVID-19 pandemic on surgeons was also investigated in this thesis (Studies 4 and 5). Qualitative thematic analysis identified four major themes: a changing and challenging work environment due to the COVID-19 pandemic; professional development and life challenges; personal change and loss, and emotional and psychological repercussions (Study 5). Quantitative analyses found that burnout increased during the pandemic's first (June 2020) to second waves (January 2021) (Study 4).

In conclusion, surgeons suffer from a high level of burnout, especially after the COVID-19 pandemic (Study 4). Without a defined retention plan, the problem affects not only surgeons through bad habits such as substance abuse, but also organisations through workforce loss due to surgeons leaving. It may also increase risks to patient safety.

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## **Definitions**

### **Burnout**

Burnout is a syndrome which is usually characterised by emotional exhaustion, depersonalisation, and a decline in a sense of personal achievement because of work-related stress (McCray et al., 2008)

### **Wellbeing**

Well-being is defined as a balance between a person's "psychological, social, and physical resource pool and the psychological, social and physical challenges faced" (Dodge et al., 2012).

### **Quality of Patient Care**

Quality of care is defined by the Institute of Medicine (IOM) as "the extent to which health services for individuals and populations increase the likelihood of desired health outcomes and are in line with current professional knowledge (Lohr & Schroeder, 1990). The World Health Organization (WHO) define it as the likelihood that intended health outcomes will occur safely and effectively (WHO, 2022).

### **Patient Safety**

Patient safety is the avoidance, prevention, and remedial processes related to adverse injuries or outcomes that result from the healthcare process (Vincent, 2011). Patient safety is linked to the quality of care, but the two concepts are not interchangeable (Vincent, 2011).

### **Adverse Events**

Any unwanted healthcare incident that causes prospective or actual physical injury, unconnected to the patient's underlying problems (Jung et al., 2019).

### **Near Miss**

This definition describes a potential error which does not happen but which, if it had, could have caused patient harm (Hall et al., 2016).

### **Professionalism**

Professional surgeons have the following characteristics: altruism, accountability, respect, integrity, submission to an ethical code, lifelong

learning, honesty, compassion, excellence, self-regulation, and service (Dreyer, 2010).

**Resilience**

Resilience is the capacity of a person to maintain a balanced emotional state when experiencing difficulties (Johnson et al., 2017).

## **Chapter 1 : Introduction**

### **1.1 Patient Safety**

In England, 237 million medication errors are estimated to occur annually, costing the UK's National Health Service (NHS) £98,462,582 a year (Elliott et al., 2021). New data from the NHS shows that between April 1, 2021, and February 28, 2022, 379 instances of medical negligence known as "Never Events" were reported. This is considered a threat to the sustainable delivery of healthcare and as such, increasing healthcare safety has been designated as a global priority (Flott et al., 2019). Early and recent research has shown that a large number of reported patient safety incidents are associated with surgical care providers (Baines et al., 2013; Bates et al., 2023; Leape et al., 1991).

Patient safety improvement initiatives focus on maximising the positive aspects of the healthcare experience while minimising the negative facets. Medical errors are the third leading cause of death in the United States (US) (Makary & Daniel, 2016). A review comprising a total of 25 studies was completed in 27 nations across six continents (Schwendimann et al., 2018). Overall, it found that a median of 10% of patients experienced at least one adverse event (range: 2.9–21.9%), with 7.3% (range: 0.6–30%) of adverse events being fatal (Schwendimann et al., 2018). Moreover, in a report on high-income countries, the World Health Organization (WHO) calculated that one in 10 patients has been harmed because of medical errors (WHO, 2019).

### **1.2 Contributors to Patient Safety**

Research attention has turned to analysing healthcare systems to understand why medical errors happen; they have been found to be complex and high-risk systems (Braithwaite et al., 2009). The components of healthcare systems are interrelated and interdependent; for instance, a particular treatment may require staff from multiple departments. Any mistake made by one component could have an impact on other components as well (Taib et al., 2011). Furthermore, systems are often heavily dependent on



human operators, reducing opportunities for the automatisisation of systems and increasing the chance of mistakes.

Fatigue and emotional health issues suffered by healthcare professionals significantly increase the risk of errors (WHO, 2016). In a systematic review of 170 studies that included 239,246 physicians, high burnout was linked to a higher likelihood of being involved in patient safety issues, reduced patient satisfaction, and lower quality care due to a lack of professionalism (Hodkinson et al., 2022).

### **1.3 Burnout**

Burnout is now included in the International Classification of Diseases 11th Revision (ICD-11) section on problems related to employment or unemployment. Burnout can be detected if the following factors are met: 1) they feel exhausted or depleted of energy; 2) they feel an increasing mental distance from their job or have feelings of cynicism or negativity towards their job; and 3) their professional efficacy is reduced (WHO, 2018). The term "burnout" refers to a "condition of vital exhaustion" that was first used by psychiatrist Freudenberger in the early 1970s in relation to healthcare professionals (Freudenberger, 1974). The usage of the term "burnout" has been increasing in published articles. In 2015, there were 985 hits for the search term "burnout", however, by 2019, there were 2,145 hits, a considerable rise from the previous years (De Hert, 2020).

Several theories have been put forward to address and explain burnout. Among them is organisational theory, which describes burnout as a consequence of work stress (Edú-Valsania et al., 2022). Golembiewski et al. (1983) introduced one of the early organisational theories of burnout, which comprises three elements: emotional exhaustion, depersonalisation and reduced professional accomplishment. The model explains the processes involved in burnout and how it happens and suggests that burnout can start due to workload, role ambiguity or organisational stress. As a result, a person may decrease their organisational commitment by showing increasing depersonalisation. The person may subsequently start to experience low personal fulfilment at work and eventually reach a state of emotional

exhaustion. The Golembiewski model is currently less used by researchers than more modern theories, (Xie et al., 2022), such as the demands–resources theory (Bakker & Demerouti, 2007), and structural theory (Edú-Valsania et al., 2022). However, some researchers have argued that the Golembiewski model remains relevant and have applied this conceptualisation to investigate burnout among information technology professionals (Gan & Gan, 2014). According to the demand–resources theory, work places several demands on people via, for example, interpersonal conflicts with clients and colleagues, task complexity, job insecurity, unfavourable schedule changes, qualitative and quantitative work overload, and personal occupational hazards. On the other hand, job resources can compensate for high demand. Potential resources can include technical knowledge and skills, socioemotional skills, positive psychological capital (i.e., self-efficacy, optimism, hope, and resilience), creativity, organisational time flexibility, job security, supervisor and peer support, and rewards. Burnout occurs when there is a difference between the demands of work and the resources it provides (Bakker & Demerouti, 2007). Structural theory explains burnout as a reaction to chronic job stress and contends that it arises when an individual’s coping techniques for dealing with these stressors fail (Edú-Valsania et al., 2022). Work stress will first activate a variety of coping mechanisms. When these initial coping mechanisms fail, it leads to professional failure as well as emotions of low personal fulfilment at work and emotional exhaustion. When trying to face these feelings, a new form of subjective coping develops called ‘depersonalisation’(Edú-Valsania et al., 2022).

When measuring burnout, the most popular questionnaire is the Maslach Burnout Inventory “MBI” (Schaufeli et al., 2001), which was created by Maslach and Jackson (1993). Twenty-two items are included in this questionnaire, which determines three burnout factors: emotional exhaustion, depersonalisation, and professional accomplishment (Maslach, 1993; Maslach & Jackson, 1986). The Oldenburg burnout inventory OLB, which has been developed to address this issue and is in widespread use, comprises solely the empirically supported components of emotional exhaustion and disengagement (Demerouti et al., 2001). Because burnout is a complex

phenomenon that is difficult to define and measure, it can be challenging to get an accurate picture of how common it is in the general population. However, the Occupational Burnout Inventory (OLBI) offers a more comprehensive and nuanced approach to understanding burnout than some other measures, such as the Maslach Burnout Inventory (MBI). Unlike the MBI, which focuses primarily on negative aspects of burnout, the OLBI includes both positive and negative aspects of burnout, such as engagement and exhaustion. This more holistic approach may help to provide a clearer picture of the prevalence and impact of burnout, despite the lack of a single, agreed-upon definition of the syndrome and the vagueness of diagnostic criteria (De Hert, 2020).

#### **1.4 Burnout among health care professionals**

Burnout is an issue of concern among many healthcare staff groups. Indeed, a systematic review and meta-analysis by Ghahramani et al. (2021) of multidisciplinary healthcare professionals demonstrated that nearly half experienced burnout during the pandemic (Ghahramani et al., 2021). It is also an issue across physician specialties, including non-surgical physicians. According to a systematic review of 109,628 physicians in 45 different countries, 67% of physicians were reported to be suffering from burnout (Rotenstein et al., 2018). After the COVID-19 pandemic began, the burnout rate among doctors increased and is now the highest on record (GMC, 2021).

Regarding the link between burnout and patient safety, Garcia et al.'s (2019) systematic review included 21 studies and found that burnout is linked to an increased risk of patient safety incidents. This systematic review also found the link between burnout and low professionalism is more pronounced in early-career workers and residents. A more recent systematic review and meta-analysis of physicians found that physicians suffering burnout were at twice the risk of being involved in a patient safety incident (Hodkinson et al., 2022). Patel et al.'s (2018) narrative review covered contributing factors leading to physician burnout and found overworked doctors may burn out due to stress from patient care.

## **1.5 Burnout in Surgeons: Are Surgeons Suffering More?**

There are several reasons why this thesis focuses on surgeons specifically. First, surgeons have one of the highest suicide rates of all medical specialties (Harvey, 2019). Second, compared to other medical professionals, surgeons are less likely to ask for help for mental health disorders (Gerada & Jones, 2014). Not only that but also, surgeons keep silent when they have an adverse event. The findings of Turner et al.,(2022) study, which focused on the impact of adverse events on 445 surgeons, revealed that a significant proportion of surgeons talk to no one after an adverse event (Turner et al., 2022). In addition, surgery is difficult, demanding, and distressing at times; therefore, it is possible that surgeons could still be at elevated risk of poor mental health even if working conditions were improved (Bolderston et al., 2020). Finally, surgeons experience more burnout than most other medical specialties (Shaikh et al., 2022; Wright et al., 2022).

Estimates of burnout prevalence in surgeons vary but are consistently high. For example, Shanafelt et al. (2009) carried out a study of over 24,000 surgeons and discovered that 40% of them were suffering from burnout. Another study by Shanafelt et al. (2010) which included 7905 surgeons, found that medical errors were attributed to individual rather than systemic issues by more than 70% of surgeons (Shanafelt et al., 2010). Furthermore, a recent systematic review has shown that 32% of surgeons in different specialties suffer from burnout (Balendran et al., 2021). Surgeons who struggle to cope with workplace stress are at a higher risk of burnout (McCray et al., 2008). Hence, in order to help enhance surgeons' well-being, further research is needed to provide a thorough understanding of the causes, and sequelae of surgeons burnout.

## **1.6 The Contributors to Surgeons' Burnout**

Numerous factors have been found to be important contributors to surgeons' burnout, such as personal characteristics, grade, work-home conflict, high working hours, and the Covid-19 pandemic (Johnson et al., 2021).

In terms of personal characteristics, there are some personality characteristics associated with reduced burnout, such as emotional intelligence (Cofer et al., 2018), emotional stability (Lindeman et al., 2017), grit and resilience (Salles et al., 2014; Shakir et al., 2020). As regards gender, the difference between male and female surgeons is unclear, with some studies suggesting that women have a higher burnout rate than men (Kinslow et al., 2020; Lindeman et al., 2017; Salles et al., 2019), while other studies have found the opposite (Elmore et al., 2016; Lebares et al., 2018).

Regarding surgical grades, surgical trainees or residents are consistently more likely to feel burnt-out than attending surgeons or consultants (Johnson et al., 2021). This is possibly due to the stress of the training process. For example, two studies found high burnout was positively linked with feeling ignored in training programme-related decisions (Coombs et al., 2020; Shetty et al., 2017).

Work-home conflict can play an essential role in making surgeons feel burned out. For example, the outcomes of a study by Dyrbye et al. (2011) found that 62.2% of female and 48.5% of male surgeons believed that work-home conflicts were linked to burnout (Dyrbye et al., 2011). This is possibly due to the long working hours involved in surgical careers, as many studies have reported that long working hours are a major cause of surgeon burnout or found a link between higher burnout and longer work hours (Coombs et al., 2020; Elmore et al., 2016; Kinslow et al., 2020).

The COVID-19 pandemic has also been a critical contributor to increases in current levels of burnout. A study in Canada found that during the COVID-19 pandemic, 41% of surgical residents reported that pandemic conditions were having a negative effect on their mental health (Alam et al., 2022). In the Netherlands, surgeons reported a higher level of burnout during the first waves of the COVID-19 pandemic compared to before the pandemic (Poelmann et al., 2021). In addition, 16.3% of surgeons in the US suffered from symptoms of post-traumatic stress disorder (PTSD) due to pandemic-related stressors (James et al., 2022). As the healthcare system is different from country to country, surgeons can be affected differently from country to country. For example, when the COVID-19 pandemic started in the UK, the

training for surgeons was paused (Khan et al., 2021). It is clear that more research is needed on UK surgeons that explores the effects of the COVID-19 pandemic on surgeon burnout and wellbeing and how burnout rates have changed in relation to the pandemic.

From the above, many elements can play a role in influencing surgeons' burnout. However, most of the studies concentrate on the contributors of burnout through quantitative surveys (Coombs et al., 2020; Dyrbye et al., 2011; Elmore et al., 2016; Kinslow et al., 2020; Lebares et al., 2018; Lindeman et al., 2017; Malik et al., 2016; Salles et al., 2019). Such surveys can report trends and patterns but are not able to generate rich and deep information relating to perceived causes and relationships between variables. As such, qualitative research is needed to further understand of these issues. Qualitative research helps researchers comprehend participants' viewpoints and experiences. Interviews, focus groups, and observations can capture the richness and complexity of surgeons experiences that quantitative methods lack. which can lead to more meaningful and relevant conclusions based on the surgeon's experiences.

### **1.7 The Link Between Burnout and Patient Safety in Surgeons: Gaps in the Literature**

An important question remains unanswered. Does surgeon burnout affect levels of professionalism, patient safety, and the quality-of-care surgeons provide to their patients? There are several systematic reviews found the link between burnout, subpar professional behaviour, and patient safety among healthcare professionals (Abraham et al., 2020; Dewa et al., 2017; Garcia et al., 2019; Hall et al., 2016; Tawfik et al., 2019). Whereas a small number of studies have been conducted in surgeons. For example, Shanafelt et al. (2010) examined the link between burnout in surgeons and their surgical performance in the United States and found that burnout levels were strongly correlated to medical error. Research in other countries, such as Germany, Poland, the Netherlands, and China, has also discovered strong associations between surgeons' burnout and negative surgical performance (Klein et al., 2010; Prins et al., 2009; Tan & Chen, 2019; Walocha et al., 2013). However, no systematic review has been conducted in order to synthesise

individual studies in surgeons and to establish the strength of this association globally. Therefore, there is a need for a systematic investigation to summarise this evidence reliably.

Moreover, when looking for individual studies focusing on the link between surgeon burnout and medical errors, the majority use quantitative designs (Prins et al., 2009; Qureshi et al., 2015). Although the link between burnout and patient safety has been established across groups of health professionals, the underlying mechanisms for this association in surgeons remain unknown. Understanding this could enhance the field of burnout research and identify areas where burnout interventions might be beneficially used to lessen surgeon burnout and concomitantly reduce the danger of surgeons providing subpar patient care. In general, there has been a lack of qualitative research into burnout in surgeons, and the research that has been done has mainly centred on its causes (Lu et al., 2020). Qualitative investigations are particularly beneficial when trying to unravel complex interactions between factors. So, there is a necessity for qualitative studies which will help to generate a deeper understanding of how surgeons understand burnout, how they deal with it, and how they see the link between burnout and patient safety.

Furthermore, the direction of the association between stress, burnout, and poor patient care is uncertain. Several major survey studies in surgeons (Klein et al., 2010; Prins et al., 2009; Shanafelt et al., 2010; Tan & Chen, 2019; Walocha et al., 2013) have provided a snapshot of burnout and associated factors at a particular time point but have not tracked participants over time. More generally, few studies have examined if burnout prospectively predicts poorer patient safety, suboptimal patient care (poor patient safety) causes burnout, or if the relationship is bidirectional (Prins et al., 2009). Research tracking surgeons over time is needed to clarify these relationships. This information could inform future burnout and patient safety interventions.

## **1.8 Aims and Objectives of the Thesis.**

Overall, this thesis aimed to deepen understanding of the causes, consequences, and sequelae of surgeon burnout and to investigate the

evaluation of the Reboot workshops for use in surgeons. The specific objectives were to:

- 1) Ascertain the strength of the association between surgeon burnout and the safety of patient care and surgical professionalism.
- 2) Identify the main factors that lead to burnout in surgeons.
- 3) Identify the coping strategies which surgeons use to manage burnout.
- 4) Understand the lived experience of burnout among surgeons.
- 5) Identify the factors underlying the relationship between surgeons' burnout and the quality and safety of patient care.
- 6) Explore the effects of the COVID-19 pandemic on surgeon burnout and mental health.

### **1.8.1 Thesis Overview and Structure**

Six studies were conducted to address these objectives and they are discussed in each of the following chapters.

**Chapter 2/Study 1** addressed objective 1. A systematic review and meta-analysis were conducted to synthesise the findings, looking into the links between burnout in surgeons and 1) patient safety and 2) professionalism. The review included empirical studies that assessed surgeons' burnout, patient safety and professionalism in patient care, which were identified through searches in five databases (PsycINFO, Ovid MEDLINE(R), EMBASE, Cochrane Database, CINAHL, and Web of Science). Results were synthesised using narrative synthesis and meta-analysis.

**Chapter 3/Study 2** focused on objectives 2 and 3 using a qualitative approach. Semi-structured interviews with 14 surgeons from various specialties were used and data were analysed using thematic analysis. The analysis was divided into two parts; the first part covered the primary causes of burnout, while the second looked at burnout management by surgeons.

**Chapter 4/Study 3** addressed objectives 4 and 5. This chapter was a secondary analysis of the interview data collected for Chapter 2, but focused on two questions; how does burnout affect surgeons personally, and what is their burnout experience like; and how does burnout affect the care that surgeons provide? This chapter also used thematic analysis.



**Chapter 5/Study 4** focused on objectives 1 and 6 by examining surgeon burnout, stress, and patient safety perceptions using a quantitative survey approach. The secondary goal was to measure surgeon burnout during the first six months of the COVID-19 pandemic. Data from a two-wave survey are presented in this chapter. Two cross-sectional groups (for surgeons who only responded at one time point) and a longitudinal group (for surgeons who responded at both time points) were created from the dataset.

**Chapter 6/Study 5** addressed objective 6. The purpose of this chapter was to understand the consequences of the COVID-19 pandemic on surgeons' mental health. This chapter analysed free text provided in response to open questions included in the first wave of the survey reported in chapter 5 (May to June 2020). The study analysed responses to two open questions: "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?" The qualitative data were analysed through thematic analysis.

**Chapter 7** presents a general discussion and synthesis of the main thesis findings and offers conclusions regarding the link between surgeon burnout and patient safety and how to improve surgeon wellbeing. This chapter also discusses the implications of the findings and outlines recommendations to help surgeons to improve their wellbeing, and as a result, improve patient safety.

## **Chapter 2 : Surgeon Burnout, Impact on Patient Safety and Professionalism: A Systematic Review and Meta-analysis**

This chapter has been published: Al-Ghunaim, T. A., Johnson, J., Biyani, C. S., Alshahrani, K. M., Dunning, A., & O'Connor, D. B. (2022). Surgeon burnout, impact on patient safety and professionalism: A systematic review and meta-analysis. *The American Journal of Surgery*, 224(1 Pt A):228-238.

### **2.1 Introduction**

Rates of burnout in surgeons are high (Pulcrano et al., 2016). Burnout is comprised of two main facets: exhaustion, feelings of work-related weariness and depersonalisation or disengagement, where professionals experience detachment from their work or patients (Halbesleben & Demerouti, 2005). A recent multi-specialty systematic review in surgeons found that up to 31% of attending surgeons and 42% of resident surgeons experience high emotional exhaustion, and high depersonalisation is reported by up to 26% of attending and 53% of resident surgeons (Pulcrano et al., 2016).

Systematic reviews of broader healthcare groups suggest that higher healthcare professional burnout is consistently linked with poorer patient safety and quality of care (Tawfik et al., 2018; Van Gerven et al., 2016). A systematic review of 47 studies and including 42,473 physicians reported that high burnout was associated with a greater risk of being involved in patient safety incidents (Panagioti et al., 2018). Individual studies in surgeons have suggested that this pattern may also be present in surgical groups specifically (Bowen et al., 2009; Qureshi et al., 2015; Sulaiman et al., 2017), but as no systematic review has sought to aggregate and synthesise these findings, the nature and strength of this association is currently unclear. Understanding this relationship is important for surgeon leaders and healthcare managers when identifying healthcare policy priorities. If present and significant, this association would suggest that tackling surgeon burnout may be a priority not only for supporting the surgical workforce but also for improving the safety and quality of patient care.

In order to address these gaps, the present review aimed to conduct a systematic review and meta-analysis of studies that investigated the association between surgeon burnout and 1) patient safety and/or 2) surgical professionalism.

## 2.2 Methodology

The protocol for the systematic review was prospectively registered on PROSPERO (registration number: CRD42019136947). The review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2010).

### 2.2.1 Search Strategy

The following databases were searched for relevant literature from inception to February 2021: PsycINFO, Ovid MEDLINE(R), EMBASE, Cochrane Database, CINAHL, and Web of Science. Reference lists of relevant studies were manually scanned for other related studies. The search terms were informed by previous similar reviews (Hall et al., 2016; Panagioti et al., 2018), and our search strategy involved combinations of three blocks of terms (burnout, physician or surgeon and patient safety or professionalism) using a combination of text words and medical subject headings (MeSH terms; Appendix A.1). The specificity of the search strategy was tested by checking whether it identified a set of eight relevant papers previously identified through non-systematic searches.

### 2.2.2 Eligibility Criteria

Studies meeting the following criteria were included (Appendix A.2):

- **Research Population:** Surgeons, including but not restricted to general surgeons, plastic surgeons, urology surgeons and transplant surgeons.
- **Condition/Exposure Studied:** Burnout syndrome, which is characterised by depersonalisation or disengagement, emotional fatigue and lack of personal satisfaction resulting from increased work-related stress (McCray et al., 2008).

- **Outcomes:** Outcomes about patient safety and aspects of professionalism, like ethical practice, empathy, and emotional restraint as types of professionalism, were considered.
- **Study Design:** Quantitative research studies including those with a cross-sectional/prospective/longitudinal design.
- **Context:** Studies in any context were considered.

#### **Studies Were Excluded if They:**

- Investigated psychological stress, depression or anxiety only and did not include a measure of burnout.
- Were published in languages other than English.
- Were a conference paper or grey literature.
- Included surgeons as part of a wider participant group of doctors and the data on surgeons specifically was not reported or provided following email request.

### **2.2.3 Study Selection**

We exported the search results from the five databases to an Excel sheet after removing all duplicates. The selection process involved two stages: the first was the title and abstract screening, and the second was the full-text screening. Two authors (TG and AD) independently screened 10% of titles during these two stages. The interrater reliability during both stages was high ( $K = 0.89$  and  $0.91$ , respectively) and any disagreement was resolved through discussion with JJ. All the remaining abstract and full text screening was completed by TG.

### **2.2.4 Data Extraction**

A data extraction sheet included the following items:

- Study characteristics—year, number of participants, research design and country.
- Participant characteristics—length of service, age and gender.

- Measurement of burnout.
- Patient safety variable.
- Patient professionalism variable.

Two authors (TG and KH) extracted 20% of the studies to check for agreement. All the remaining data extraction was completed by TG. Ten studies included surgeons as part of a wider participant group of doctors. We contacted these authors and asked them if they could provide the data for surgeon participants alone, rather than the whole data set. Six study authors responded that they could not provide this data (Ferreira et al., 2020; Lee et al., 2018; Loerbroks et al., 2017; Park et al., 2016; Parshuram et al., 2015; Sulaiman et al., 2017), and two study authors did not respond (Chen et al., 2013; Nishimura et al., 2019; Prins et al., 2009), so these studies were excluded. One of the ten studies provided the data of surgeons, so we included it in this review (Walocha et al., 2013).

### **2.2.5 Quality Assessment and Risk of Bias**

As studies included in the review did not test interventions but instead assessed the presence of associations, we used an adapted version of the Cochrane Risk of Bias tool (Higgins, 2011) along with additional categories to assess the reliability and validity of the measures used (Hall et al., 2016). These criteria have seven elements: Representativeness, Randomisation, Blinding, Measures of patient safety, Measures of burnout, Confounding variables and Power and effect sizes (see Appendix A.3).

Each article was assessed using the quality assessment tool (see appendix A.4), and all articles were then summarised together to give an overall quality score. Two reviewers (TG, KH) independently undertook 10% of the risk of bias assessment, the interrater agreement Kappa was high 0.98, and the remaining coding was completed by TG.

### **2.2.6 Analyses**

The main analyses synthesised the overall effect size for the association between surgeon burnout and patient safety across all included studies. Odds ratios (ORs) and 95 per cent confidence intervals (CIs) were used as the index of effect size as these were the most widely recorded effect size across the

primary studies. The data were analysed using a random effects model in Comprehensive Meta-Analysis (CMA) (Borenstein et al., 2014). We used the required transformations in CMA for the various different metrics as suggested by the Cochrane Handbook (Higgins, 2011) to obtain ORs where ORs and their standard errors were not recorded in the primary reports. If the OR > 1, this indicated that higher burnout was associated with poorer patient safety outcomes. In contrast, an OR <1 indicated that burnout was associated with better patient safety outcomes. The  $I^2$ -statistic and related test-based 95 per cent CIs were used to measure heterogeneity. Small, moderate, and high heterogeneity, are represented by  $I^2$  values of 25%, 50%, and 75%, respectively (Higgins, 2011). To measure sensitivity, this study followed Higgins et al's strategy and re-ran the meta-analyses numerous times, deleting one study at a time (Higgins, 2011). Publication bias was examined by exploring the symmetry of funnel plots and the statistical significance of Egger's test (Egger et al., 1997).

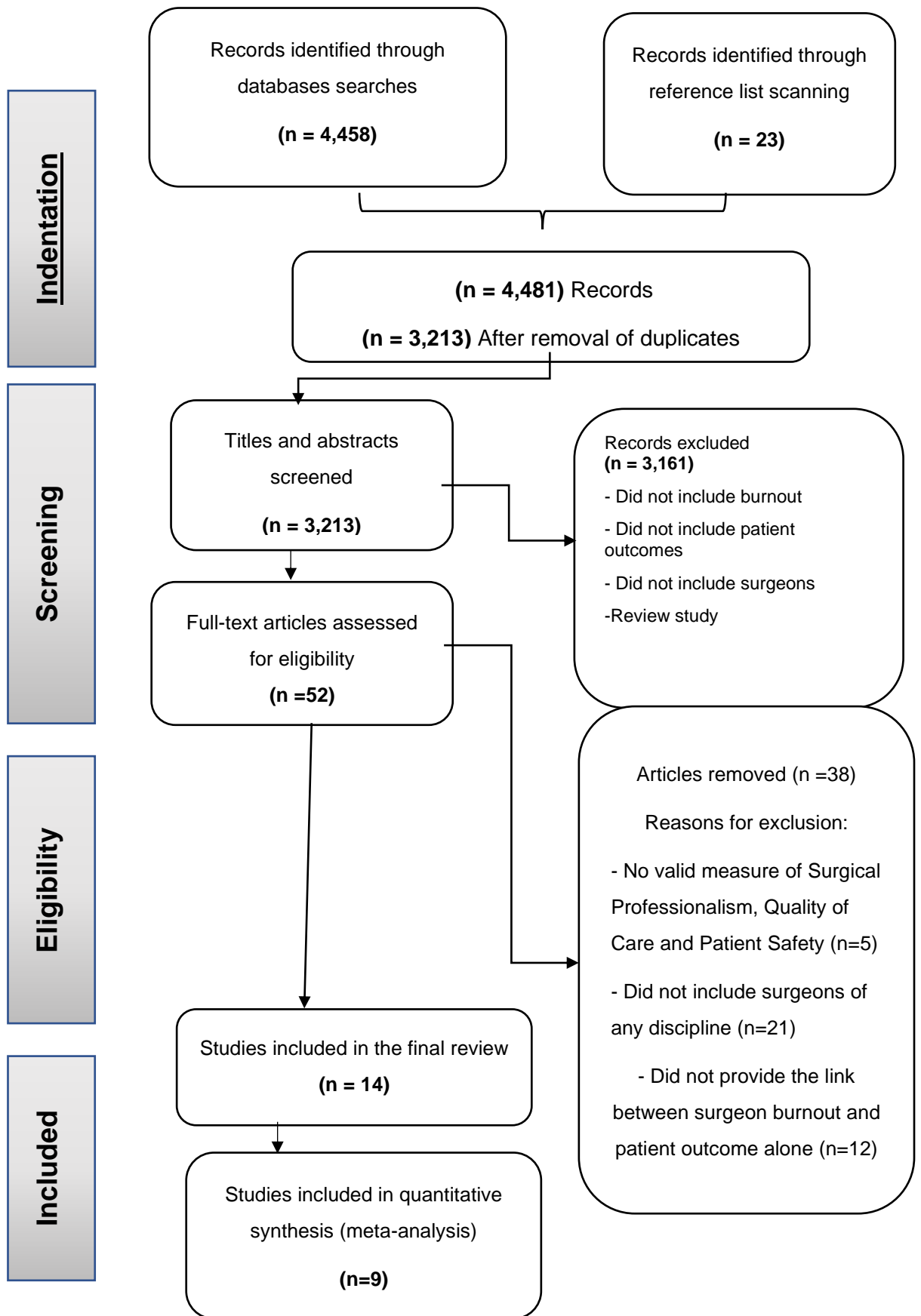
## **2.3 Results**

A total of 4,458 articles were identified from the database search, and an additional 23 records were located through hand and citation searching. After the removal of duplicates, 3,213 articles were included in the title and abstract screening phases. 44 articles were retained for full-text screening and 14 articles were included in the final review. Of these, nine were included in the meta-analysis (Figure 2-1).

### **2.3.1 Descriptive Analysis and Study Characteristics**

Descriptive information for all studies is presented in Table 2.1. The 14 studies included 27,248 surgeons with a mean age of 38.50 (Balch et al., 2009; Coombs et al., 2020; Crijns et al., 2020; Faivre et al., 2018; Kassam et al., 2021; Qureshi et al., 2015; Shanafelt et al., 2010; Soh et al., 2020; Zheng et al., 2018), with five studies not reporting participant age (Hewitt et al., 2021; Klein et al., 2010; Tsiga et al., 2017; Walocha et al., 2013; Windover et al., 2018). Of the studies that were included, 20,349 (74%) surgeons were male, 4,792 (18%) were female (Balch et al., 2009; Coombs et al., 2020; Crijns et al., 2020; Faivre et al., 2018; Hewitt et al., 2021; Kassam et al., 2021; Klein et

al., 2010; Qureshi et al., 2015; Shanafelt et al., 2010; Zheng et al., 2018) with four remaining studies not providing gender information (Soh et al., 2020; Tsiga et al., 2017; Walocha et al., 2013; Windover et al., 2018). Information regarding surgical specialities is presented in Table 2.2. Five studies included trainee surgeons (Hewitt et al., 2021; Kassam et al., 2021; Qureshi et al., 2015; Walocha et al., 2013), six studies included practicing surgeons (Balch et al., 2011; Crijns et al., 2020; Shanafelt et al., 2010; Soh et al., 2020; E. Tsiga et al., 2017; Zheng et al., 2018), and the Klein et al (2010) study include both training and practicing surgeons. In two studies the types of surgeons recruited were unclear (Tsiga et al., 2017; Windover et al., 2018). In terms of the geographical regions of the studies that were included, nine were from United States (Balch et al., 2009; Coombs et al., 2020; Crijns et al., 2020; Hewitt et al., 2021; Kassam et al., 2021; Qureshi et al., 2015; Shanafelt et al., 2010; Soh et al., 2020; Windover et al., 2018), four from Europe including France, Germany, Greece and Poland (Faivre et al., 2018; Klein et al., 2010; Tsiga et al., 2017; Walocha et al., 2013), and one from China (Zheng et al., 2018).



**Figure 2-1: Flow diagram of article selection.**



**Table 2.1: Characteristics of the studies included in the review:**

1 <sup>st</sup> Author	Year	Country	Design	Sample of Surgeons	Speciality	Gender	Burnout Measure	Patient Safety	Professionalism	Key Finding	Significant correlation
Balch et al. (2009)	2011	America	Cross-sectional survey	7,164	Breast:285 Cardiothoracic:436 Colorectal: 264 General: 2,737 Neurology: 164 Obstetrics and Gynecology: 83 Oncologic: 227 Ophthalmologic:152 Orthopaedic: 149 Otolaryngology: 409	Male: 6,116 Female: 1,049 Missing: 32	The Maslach Burnout Inventory (MBI)		Malpractice lawsuits “Have you gone through a medical malpractice suit in the last 2 years?”	Recent malpractice suits were strongly related to burnout (p < 0.0001).	Significant

					Paediatric: 224 Plastic: 370 Transplant: 124 Trauma: 324 Urologic: 306 Vascular: 460 Other: 440 Missing: 40					
Crijns et al. (2020)	2020	America	Cross-sectional survey	203	Hand surgery: 84 Orthopaedic trauma: 66 Shoulder and elbow: 17 Arthroplasty: 7 General Surgery: 7 Foot and Ankle: 6 Surgical Sports: 5 Paediatric: 4	Male: 186 Female: 17	MBI	Medical error "How many days in the last 3 months have you been uncomfortable in the aftermath of care or worried about	A greater level of emotional exhaustion was associated with a greater number of perceived medical errors	Significant

					Plastic Surgery 4			errors or adverse events in spite of conscientious effort?"			
Coombs et al. (2020)	2020	America	Cross-sectional survey	146	Plastic Surgeon: 146	Male:84 Female: 61	Stanford Professional Fulfillment Index	Stanford Professional Fulfillment Index(Include admission of medical errors)		Burnout was significantly associated with reporting making a major medical error that could have harmed a patient.	Significant
Faivre et al. (2018)	2018	France	Prospective survey	107	Orthopaedic and Trauma Surgery	Male:70 Female: 37	MBI	Medical error (single question)		The statistical analysis identified 3 risk factors for burnout syndrome, one of them being medical errors (odds	Significant

										ratio [OR], 8.8; 95% confidence interval [95% CI], 1.7–58.7; $p = 0.0121$ ).	
Hewitt et al. (2021)	2020	America (Chicago)	Cross-sectional survey	7395	General Surgeons	Male: 4530 Female: 2831	MBI	Self-reported error (Have you had medical error in the last 6 months?, follow-up a single question regarding near-miss medical errors and a single question about		Residents were more likely to report a harmful medical error if they reported frequent burnout symptoms [OR 2.71 (95% CI 2.16–3.41)] or poor psychiatric wellbeing [OR 2.36 (95%), CI 1.92–2.90)].	Significant

								patient harm)			
Kassam et al. (2021)	2020	U.S.	Cross-sectional survey	77	Transplant Surgery:77	Male:50 Female:27	MBI	Medical error (single question)		surgeons with burnout were more likely to make a medical error (35.3% vs 5.2%, p=0.003).	Significant
Klein et al. (2010)	2010	German	Cross-sectional survey	1311	General Surgery:681 Gynaecological: 241	Male:789 Female:522	The Copenhagen Burnout Inventory (CBI)	Medical error (2 questions; diagnostic errors and therapeutic errors)	Self-rated patient care (Chirurgische Qualitätssiegle)	Burnout is significantly associated with perceived quality of care among male (OR from 1.5 to 2.6) but not among female surgeons (OR from 1.3 to 1.5).	Significant about male
Qureshi et al. (2015)	2015	America	Pilot survey	1691	Plastic Surgeons 169	Male:1243 Female:425	MBI	Medical error (single		plastic surgeons with burnout also	Significant

						Missing: 23		question )		had a nearly two-fold increased risk of self-reported medical errors and self reported impairment	
Shanafelt et al. (2010)	2010	America	Cross-sectional survey	7,905	Missing: 44 Cardiothoracic: 489 Colorectal 302 Dermatologic 2 General 3233 Otolaryngology 368 Obstetrics/gynecology 105 Oncologic 407 Pediatric 181 Plastic 458	Male: 6815 Female: 1043 Missing:	MBI	Medical error (a single question about have you made a major medical error in last three months, follow up with another question related to Greatest contribu	-	Reporting an error during the last 3 months had a large, statistically significant adverse relationship with all 3 domains of burnout (emotional exhaustion, depersonalization and personal accomplishment).	Significant

					Transplant 123 Trauma 345 Urologic 315 Vascular 463 Other 488			ting factor in medical error)			
Soh et al. (2020)	2020	America	Cross-sectional survey	871	Unclear	Unclear	MBI		Reported malpractice allegations in the preceding 2 years	Malpractice allegations were significantly associated with surgeon burnout (odds ratio, 1.78 [1.01-2.15]; P.041)	Significant
Tsiga et al. (2017)	2017	Greece	Cross-sectional survey	117	Unclear	Unclear	MBI	Medical error checklists (MEC)		Regarding the frequency of medical errors, the results show significant positive associations with emotional	Significant

										exhaustion (R = 0.200, p = 0.006) and depersonalisation (R = 0.264, p = 0.005).	
Walocha et al. (2013)	2013	Poland	Cross-sectional survey	19	Unclear	Unclear	MBI		Empathy Mehrabian and Epstein Emotional Empathy Scale (EES)	For the whole group, negative correlations were noted between the level of emotional exhaustion, depersonalisation and the total level of burnout (according to MBI) and the level of empathy (according to TAT) (r = -0.30, p <0.05;	Negative correlation



										$r = -0.39, p < 0.01; p = -0.32, p < 0.01,$ respectively).	
Windover et al. (2018)	2018	America	Cross-sectional cohort design	139	Unclear	Unclear	MBI		Patient satisfaction "Consumer Assessment of Healthcare Providers and Systems surveys"	There was no significant association between burnout and productivity or patient satisfaction with inpatient or specialty care.	Not significant
Zheng et al. (2018)	2018	China	Cross-sectional survey	202	Orthopaedic Surgeons: 202.	Male:20 2 Female: 0	MBI		Losing temper  The last section of the questionnaire was designed to investigate intraoperative irritability, including frequency,	The overall rate of burnout was 85.1%. Variables were significantly associated with high emotional exhaustion.	Significant

									possible reasons, consequences, participants' attitude and career satisfaction.		
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**Table 2.2: Speciality of surgeons in included studies (N =27,248 participants)**

<b>Number of studies</b>	<b>Speciality</b>	<b>Number of surgeons</b>	<b>Percentage of speciality (out of total number of surgeons)</b>
Four studies (Balch et al., 2009; Crijns et al., 2020; Klein et al., 2010; Shanafelt et al., 2010)	General Surgery	14,572	53.48%
Four studies (Balch et al., 2009; Coombs et al., 2020; Qureshi et al., 2015; Shanafelt et al., 2010)	Plastic Surgery	2,669	9.80%
Five studies (Balch et al., 2009; Crijns et al., 2020; Faivre et al., 2018; Shanafelt et al., 2010; Zheng et al., 2018)	Orthopaedic and Trauma Surgery	1,310	4.81%
Two studies (Balch et al., 2009; Shanafelt et al., 2010)	Cardiothoracic Surgery	925	3.39%
Two studies (Balch et al., 2009; Shanafelt et al., 2010)	Vascular Surgery	923	3.41%
Two studies (Balch et al., 2009; Shanafelt et al., 2010)	Oncologic Surgery	919	3.37%
Two studies (Balch et al., 2009; Shanafelt et al., 2010)	Otolaryngology Surgery	777	2.85%
Two studies (Balch et al., 2009; Shanafelt et al., 2010)	Urology Surgery	621	2.28%

Two studies (Balch et al., 2009; Shanafelt et al., 2010),	Colorectal Surgery	566	2.08%
One study (Balch et al., 2009)	Ophthalmologic Surgery	152	0.56%
Two studies (Balch et al., 2009; Shanafelt et al., 2010)	Paediatric Surgery	405	1.49%
Three studies (Balch et al., 2009; Klein et al., 2010; Shanafelt et al., 2010)	Obstetrics and Gynaecology Surgery	429	1.57%
Three studies (Balch et al., 2009; Kassam et al., 2021; Shanafelt et al., 2010)	Transplant Surgery	324	1.19%
One study (Balch et al., 2009).	Neurosurgery	164	0.60%
One study (Shanafelt et al., 2010)	Dermatologic Surgery	2	0.01%
Five studies (Balch et al., 2009; Shanafelt et al., 2010; Tsiga et al., 2017; Walocha et al., 2013; Windover et al., 2018).	No clear speciality (surgeons did not mention their speciality)	1.869	6.86%

### 2.3.2 Measurement of Burnout

Twelve studies (Balch et al., 2009; Crijns et al., 2020; Faivre et al., 2018; Hewitt et al., 2021; Kassam et al., 2021; Qureshi et al., 2015; Shanafelt et al., 2010; Soh et al., 2020; Tsiga et al., 2017; Walocha et al., 2013; Windover et al., 2018; Zheng et al., 2018) measured burnout using some variant of the Maslach Burnout Inventory (MBI)(Maslach C, 1996), and one study (Klein et al., 2010) used the Copenhagen Burnout Inventory (CBI) (Klein et al., 2010).The study by Balch et al. (2009) used two items to measure burnout: MBI and two added questions that measure emotional exhaustion and

depersonalization. The study by Coombs et al. (2020) used the Stanford Professional Fulfilment Index (Medicine) (Table 2.1).

### **2.3.3 Patient Outcomes**

Nine studies focused on patient safety and measured patient safety by asking self-reported questions about whether there had been medical errors with a yes/no response format (Balch et al., 2009; Coombs et al., 2020; Crijns et al., 2020; Faivre et al., 2018; Hewitt et al., 2021; Kassam et al., 2021; Klein et al., 2010; Shanafelt et al., 2010; Soh et al., 2020). One study used standardised questions to evaluate medical errors designed by the authors and pilot tested by 19 surgeons (Qureshi et al., 2015), and a final study developed a checklist of medical errors developed by the authors with each item representing a different type of error (Tsigas et al., 2017). Six studies measured professionalism, including empathy, loss of temper and patient satisfaction (Balch et al., 2009; Klein et al., 2010; Soh et al., 2020; Walocha et al., 2013; Windover et al., 2018; Zheng et al., 2018). One study (Walocha et al., 2013) used the Mehrabian and Epstein Emotional Empathy Scale (EES) (Mehrabian & Epstein, 1972). In addition, one study (Zheng et al., 2018) used a questionnaire about the loss of temper. This questionnaire was designed by authors to investigate intraoperative irritability, including frequency, possible reasons, consequences, participants' attitudes and career satisfaction (Zheng et al., 2018). The study by Windover et al. (2018) measured patient satisfaction by referring to "Consumer Assessment of Healthcare Providers and Systems surveys" (Windover et al., 2018). Two studies measured malpractice; Balch et al. (2011) studied the malpractice issues by asking one question: "Have you gone through a medical malpractice suit in the last two years?" (Balch et al., 2009) and the study of Soh et al. (2020) used a survey created by the Society for Vascular Surgery that included questions related to medical errors and malpractice litigation (Soh et al., 2020).

### **2.3.4 Narrative Synthesis: Surgeon Burnout and Professionalism**

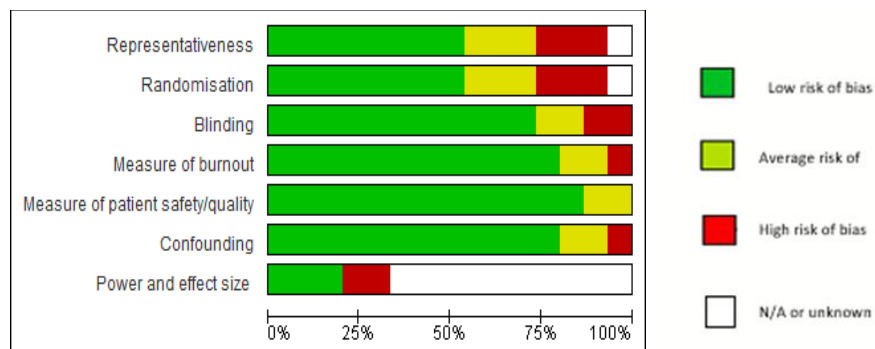
Four studies found that surgeon burnout was linked to surgeon professionalism (Balch et al., 2009; Klein et al., 2010; Soh et al., 2020; Zheng et al., 2018). These included one study about the loss of temper, finding that surgeons with high emotional exhaustion were more likely to report losing their

temper (Zheng et al., 2018). Another study found negative correlations between levels of burnout and empathy (Walocha et al., 2013). In addition, two studies found that malpractice suits were strongly related to burnout (Balch et al., 2009; Soh et al., 2020).

One study found higher burnout was significantly associated with poorer perceived quality of care among male but not among female surgeons (Klein et al., 2010). In contrast, one study found no link between surgeon burnout and patient satisfaction (Windover et al., 2018).

### 2.3.5 Study Quality and Risk of Bias

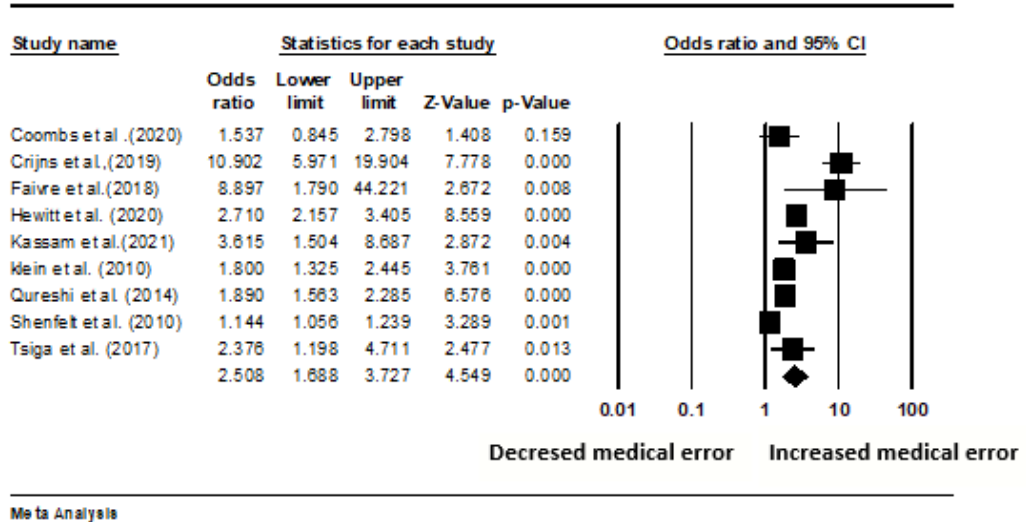
Figure 2-2 shows the percentages for each risk of bias item across all studies considered. The highest risk of bias was found for representativeness and randomisation with a 20% risk of bias; next was for blinding and power and effect size with a 10% risk of bias. Also, only a small number of studies reported the power and effect size. The measure of burnout and confounding had only a 5% risk of bias.



**Figure 2-2: The overall study quality and risk of bias profile across 14 studies**

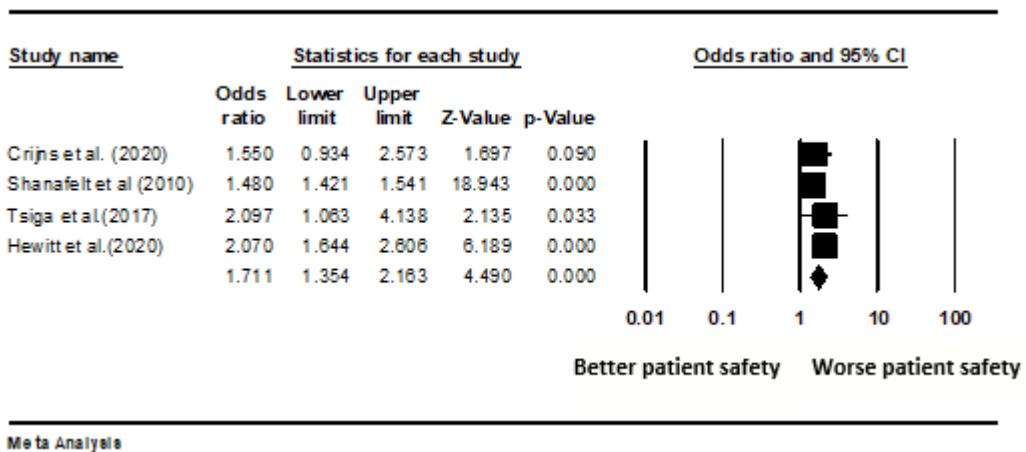
### 2.3.6 Main Meta-analysis Findings

Surgeon burnout was associated with 2.5-fold increased risk of medical error ( $OR = 2.51$ ;  $95\% CI [1.68-3.72]$ ) (Figure 2-3), but the heterogeneity was high ( $I^2 = 93.62$ ). Eight out of nine of the studies reported a significant relationship between higher surgeon burnout and a greater risk of medical error.

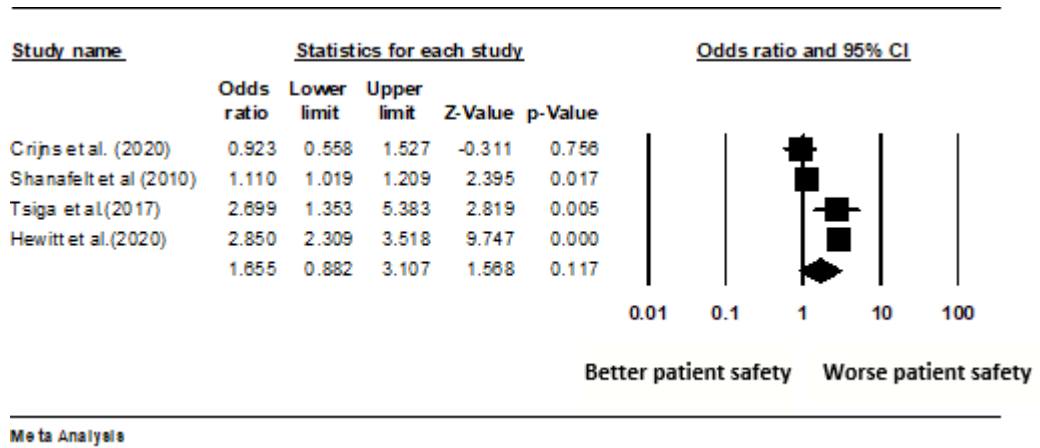


**Figure 2-3: A proportional forest plot of the relationship between surgeon burnout and medical error (k = 9).**

Next the analyses explored the sub facets of burnout. A significant positive association was found between higher levels of emotional exhaustion and a greater likelihood of being involved in a patient safety incident (OR=1.71, 95% [1.35-2.16]) with a moderate amount of heterogeneity ( $I^2=66.1\%$ ), see Figure 2-4. There was no significant association (Figure 2-5) between the depersonalisation component of burnout and medical errors (OR= 1.66, 95% CI [0.88-3.11]) with a high level of heterogeneity ( $I^2=95.84\%$ ).

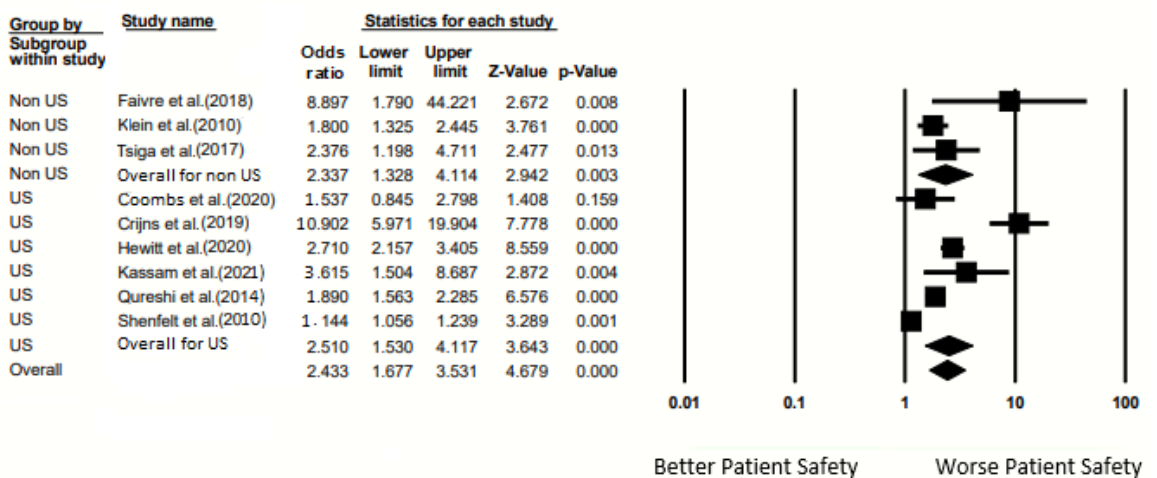


**Figure 2-4: A proportional forest plot of the relationship between surgeon emotional exhaustion and patient safety outcome (k = 4)**



**Figure 2-5: A proportional forest plot of the relationship between surgeon depersonalisation and patient safety outcome (k = 4).**

To assess whether the association between burnout and patient safety varied between countries, a sub-group analysis was performed between studies conducted in the United States ( $k = 6$ ) and studies conducted in other countries ( $k = 3$ ). The results of these analyses found no significant differences in the magnitude of the burnout-medical error association between these groups of studies ( $p = 0.85$ ) (Figure 2-6). We found a significant association between burnout and medical error in the studies conducted in the United States ( $OR=2.51; 95\%CI [1.53-4.11]$ ) with high heterogeneity ( $I^2=95.66$ ) and in the studies conducted in other countries ( $OR=2.33; 95\% CI[1.32-4.11]$ ), although heterogeneity was moderate in the latter case ( $I^2=50.22\%$ ).



**Figure 2-6: A sub-group analysis between US and non-US studies.**

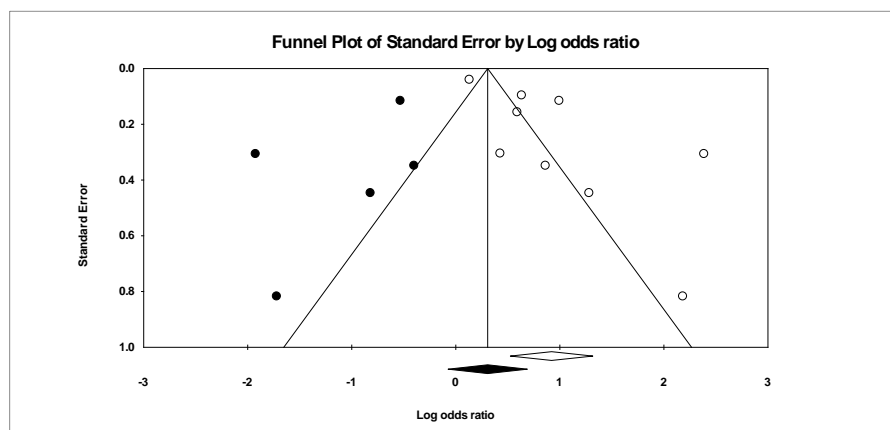


### 2.3.7 Sensitivity Analysis

As outlined above, we followed Higgins et al's approach and re-ran the meta-analyses multiple times by removing one study at a time to assess the sensitivity (Higgins, 2011). We found the odds ratio between surgeon burnout and patient safety varied from 1.32 to 2.23, but remained statistically significant, suggesting the meta-analytic results were not unduly influenced by any individual study. The odds ratio between emotional exhaustion and patient safety varied from 1.48 to 1.98 yet remained statistically significant, implying that no single study altered the meta-analytic results disproportionately. However, for depersonalisation the odds ratio varied from 1.28 to 1.99 but was not statistically in any of the analyses.

### 2.3.8 Publication Bias

The presence of publication bias was investigated across the nine studies included in the main meta-analysis. Egger's regression test showed that publication bias could have affected the findings ( $intercept = 4.11$ ,  $SE = 1.28$ ,  $p = 0.007$ ) (Egger et al., 1997). The funnel plot (Figure 2-7) and Duval and Tweedie's trim and fill analysis revealed that there were no missing studies to the right of the mean; however, there may have been five missing studies to the left of the mean (Duval & Tweedie, 2000). When the five missing studies were imputed the relationship between surgeon burnout and medical error is no longer significant ( $OR = 1.35$ ,  $95\ CI = 0.92\ to\ 1.98$ ).



**Figure 2-7: Funnel plot of publication bias with observed (white) and imputed (shaded) studies.**

## **2.4 Discussion**

### **2.4.1 Summary of Findings**

This review investigated the association between surgeon burnout and 1) patient safety and 2) surgical professionalism. The meta-analytic results indicated that higher burnout (include three elements of burnout), was significantly associated with a higher risk of involvement in a medical error. Higher emotional exhaustion was also significantly associated with higher risk of a medical error, but there was no association between depersonalisation and burnout. Higher emotional exhaustion was also significantly associated with higher risk of a medical error, but there was no association between depersonalisation and burnout. Maslach and Leiter (2021) have warned against equating emotional exhaustion (only) with burnout. The results regarding professionalism were too diverse for pooling using meta-analysis, but the narrative synthesis indicated two similar studies linked higher surgeon burnout to poorer surgeon professionalism, which included reduced empathy and loss of temper. Moreover, two studies (Balch et al., 2009; Soh et al., 2020) found malpractice suits were strongly related to higher burnout and one study found that surgeon burnout had no significant relationship with the patient satisfaction.

### **2.4.2 Comparisons with Previous Reviews**

The results outlined in this systematic review are in line with those of previous systematic reviews which indicate that higher burnout is associated with poorer patient safety in physicians and healthcare providers more broadly (Abraham et al., 2020; Dewa et al., 2017; Garcia et al., 2019; Hall et al., 2016; Tawfik et al., 2019). The present findings are also consistent with previous systematic reviews indicating associations between higher burnout and poorer professionalism, as indicated by outcomes such as poorer physician empathy (Tawfik et al., 2019). The present review extends these findings by reporting on these associations in surgeons specifically, which are a group known to report higher levels of burnout than other medical specialties (Johnson et al., 2021).

The question of whether burnout affects medical errors or medical errors affect surgeons is currently unclear. However, there is emerging evidence to suggest that the relationship is likely to be cyclical and bidirectional. For example, a longitudinal study by West et al. (2006) investigated the association between burnout and medical errors in resident doctors and found that a medical error at one time point was associated with increased burnout at the next time point; similarly, burnout at one time point was associated with greater risk of a medical error at the next time point (West et al., 2006). More recently, a qualitative study on general practitioners by Hall et al. (2018) also found evidence that the relationship between patient safety and burnout was a cycle, such that patient safety issues lead to burnout, and burnout leads to patient safety issues (Hall et al., 2018).

In addition, the current systematic review includes only one study of patient satisfaction, which found no evidence of a connection between surgeon burnout and patient satisfaction. That result is contrary to the one obtained by Anagnostopoulos et al.,(2012) which showed that physician burnout affected patient satisfaction (Anagnostopoulos et al., 2012). Nevertheless, due to the mixed findings, there is a need for further studies to clarify the link between surgeon burnout and surgical professionalism as well as patient satisfaction. Perhaps, the research designs will have to be broadened to include a focus on underlying factors that cause the difference in results. A possible alternative explanation for the disparate results could be that cultural differences or commonly accepted behaviours cause some surgeons to go on sick leave earlier than other surgeons. Surgeons may leave the work environment before they become burnt out and return when they have had a period of recovery. The meta-analysis found the association between burnout and medical errors was similar in US and non-US countries, suggesting this association may be a global phenomenon.

### **2.4.3 Implications for Practice and Future Research**

These results suggest that reducing surgeon burnout may improve the quality of patient care and surgical professionalism. Similarly, improving the quality of care may help to reduce surgeon burnout as the association between burnout and medical errors appears to be cyclical. Therefore, there

is an urgent need for the development of effective and evidence-based interventions to improve 1) burnout and 2) patient safety, which will likely also feed back into helping to reduce surgeon burnout.

While a systematic review synthesising studies across physicians suggested that interventions such as the one aimed at improving the culture of health care organizations and interventions focused on individual physicians may reduce burnout in physicians broadly (Panagioti et al., 2018), there is currently insufficient evidence for a synthesis of studies in surgeons in particular. Given the time pressure healthcare systems are under in the wake of the COVID-19 pandemic (Al-Ghunaim, Johnson, Biyani, & O'Connor, 2021), having access to evidence-based and time-limited interventions is crucial in ensuring optimal use of staff time and resources.

Surgeon burnout is costly to healthcare organizations and jeopardizes a core social demand for safe care. On the other hand, medical errors have a substantial financial cost. Whereas surgeons are less likely than other medical practitioners to seek assistance (Gerada & Jones, 2014). To solve these issues, organizations, surgeons, and psychologists should work together to deliver more effective interventions for surgeons, which may enhance surgeon retention.

Furthermore, more research is needed that focuses on the impact of surgeon burnout on patient care across a wider range of countries, to help establish whether there are cultural differences in how burnout affects surgeons and surgical practice. Also, there is a need for studies into surgeon burnout reduction interventions in low and middle-income countries in particular. To date, the great majority of studies have been in high-income countries (Brady et al., 2012; Fortney et al., 2013; Foureur et al., 2013), but these may not translate to other nations. Finally, a recent review has shown that surgical trainees are more burned out than their non-surgical counterparts (Johnson et al., 2021), therefore, healthcare providers ought to also explore how training programmes can be modified to help support trainees earlier in their careers.

#### **2.4.4 Strengths and Limitations**

This review has a number of strengths, including a large sample size of surgeons in the included studies ( $n = 27,248$ ) and the use of meta-analysis which enabled the strength of the association between burnout and patient safety incidents to be estimated. The review included nine studies for meta-analysis, which is above the median number of studies included in a Cochrane review which is six (Borenstein et al., 2021). However, it should be noted that this number falls below 10, which may have reduced the ability of the Egger test to detect publication bias. According to Sterne et al., if there are fewer than 10 studies in a meta-analysis, funnel plot asymmetry cannot be used as reliably because test power is normally insufficient to differentiate chance from true asymmetry (Sterne et al., 2011). Other limitations of the review pertain directly to the limitations of the studies used. More specifically, five of the included studies use only one question to measure patient safety (Balch et al., 2009; Faivre et al., 2018; Kassam et al., 2021; Qureshi et al., 2015; Shanafelt et al., 2010). There was heterogeneity across the studies due to having only nine studies in the meta-analysis and the poor quality per our evaluation in the measurement of patient safety, which is also likely to be to the detriment of the findings. This is an indication of the need for more and higher quality prospective studies to be carried out which can examine this association longitudinally.

There were also some limitations in relation to the representativeness (Crijns et al., 2020; Shirom et al., 2006; Soh et al., 2020; Walocha et al., 2013), randomisation (Coombs et al., 2020; Faivre et al., 2018; Soh et al., 2020; Zheng et al., 2018), and blinding (Shirom et al., 2006; Windover et al., 2018) of original studies, with these studies scoring as low or unclear on these variables. However, low scores on such variables are common in previous similar reviews (Hall et al., 2016).

#### **2.4.5 Conclusion**

This systematic review and meta-analysis found surgeon burnout was significantly associated with a higher incidence of medical errors. This shows that there is a pressing need for more interventions to help surgeons improve their wellbeing, as this may help reduce burnout occurrences, result in a reduction of medical errors and improved client satisfaction in healthcare settings. The findings of this research can therefore be used as a stimulus to

put in place better policies and support, in order to reduce or prevent surgeon burnout. Conducting more in-depth future research can help understand the associations between surgeon burnout and environmental factors. Gaining a better understanding of environmental factors that cause burnout can lead to better decision-making among the people in charge of healthcare administration.

## **Chapter 3 : Burnout in Surgeons: a Qualitative Investigation into Contributors and Potential Solutions**

This chapter has been published: Al-Ghunaim, T., Johnson, J., Biyani, C. S., & O'Connor, D. B. (2022). Burnout in surgeons: A qualitative investigation into contributors and potential solutions. *International Journal of Surgery*, 101, 106613.

### **3.1 Introduction**

Burnout rates in surgeons are high. Studies from the United States (US), Germany, and China have reported burnout rates of 40%, 48.7%, and 85.1% in surgeons, respectively (Klein et al., 2010; Shanafelt et al., 2009; Zheng et al., 2018). A systematic review found the percentage of burnout among surgeons from multiple specialties in the United Kingdom (UK) was 32.0% (Balendran et al., 2021). Similarly, a study of 1971 surgeons from 127 National Health Service (NHS) hospital trusts found that one-third of the respondents showed high mean levels of burnout or exhaustion (Upton et al., 2012). Surgeons experience varying degrees of burnout in different specialties. The US Medscape 2021 survey found that those working in urology had the highest level of burnout (49%), followed by neurology (47%), then general surgeons (35%), orthopaedics (33%), and plastic surgeons (31%) (Kane, 2021). These findings are concerning, particularly as several studies have found a link between surgeon burnout and poorer quality of patient care (Klein et al., 2010; Loerbroks et al., 2017; Shirom et al., 2006). Furthermore, research indicates an association between higher surgeon burnout and a higher rate of medical errors (Prins et al., 2009; Qureshi et al., 2015; Sulaiman et al., 2017).

Burnout interventions have generally had significant but small effects (Panagioti et al., 2017; West et al., 2016) and there is a need for the development of more effective solutions. Qualitative research could be useful in this endeavour. First, qualitative research can be used to generate deep, high-quality information regarding surgeons' experiences of contributors to burnout and potential solutions, which can be used to inform the development of future interventions. Second, qualitative research can highlight unexpected

results, enabling the identification of novel solutions not previously considered. For example, a qualitative study in general practitioners (GPs) highlighted some unexpected strategies to improve general practitioner wellbeing, such as the scheduling of compulsory team coffee breaks (Hall et al., 2018). However, no similar studies have been conducted in surgeons.

Addressing this gap and improving support for surgeons is imperative. Among all medical professionals, surgeons have one of the highest suicide rates (Harvey, 2019). In addition, surgeons are less likely than other medical practitioners to seek assistance (Gerada & Jones, 2014). In light of this, the proposed study had two main aims: firstly, to explore the main contributory factors that lead surgeons to experience burnout; and secondly, to examine how surgeons cope with the burnout they experience at work.

## **3.2 Methodology**

This qualitative study was conducted using semi-structured interviews and followed a thematic analysis approach (Braun & Clarke, 2006). This specific method of analysis was chosen because it could generate unanticipated insights into the contributors to surgeons' burnout and how surgeons cope with burnout. The study has followed the Standards for Reporting Qualitative Research (SRQR), which contains 21 items (O'Brien et al., 2014). This study is registered at the Research Registry, the identifying number is: researchregistry7651 (Al-Ghunaim et al., 2022).

### **3.2.1 Study Design**

This research employed semi-structured face-to-face or telephone interviews (pre-COVID-19), which provided in-depth information and knowledge of the topic and were useful for obtaining first-hand accounts of surgeons' experiences. The data reported in the present paper were part of a wider study which also investigated the link between burnout and patient care.

### **3.2.2 Creating the Interview**

A proforma collected information about the participants, such as grade, speciality, the number of years working as a surgeon and the type of hospital they worked in. The full interview schedule (Appendix B.1) included three parts



relating to: 1) definitions and experiences of burnout, 2) contributors to burnout and coping strategies and 3) how burnout may affect the quality and safety of patient care (Kane, 2021). It was the data pertaining to the first two sections that were analysed in the current paper.

### **3.2.3 Data Collection**

The study employed purposive sampling, an approach often used when a diverse sample is necessary (Martínez-Mesa et al., 2016). The sample comprised surgeons from diverse specialities who had a range of experience, as it was anticipated that burnout might vary across specialties. The first author attended four surgeons' meetings in different specialties, talked about the study, and asked surgeons who wanted to participate in the interview to leave their contact details. The setting of this study was surgical departments in the United Kingdom's NHS. Participants were also recruited via social media networks, such as Twitter; surgeons from various surgical specialties around the UK were encouraged to participate in the interviews. The Twitter advertisement was comprised of five tweets with the hashtag's "surgeons", "UK", and "NHS", which were sent out at different times.

This study included 14 participants and provided rich data to fulfil the study's aims. Recruitment ceased once it was deemed by the authors that the qualitative data collected provided sufficient information to meet the study aims. The certainty about the sample size in qualitative research is different from quantitative research. In qualitative research, the term "saturation" is frequently used to describe the observation that further interviews are not generating new insights. The more information the sample has provided that is relevant to the research questions, the fewer participants are required (Malterud et al., 2016; Martínez-Mesa et al., 2016). The interview was recorded and deleted from the recording device to ensure confidentiality within 72 h. The data collection took place between 8 August 2019 and January 15, 2020. The ethics committee of the School of Psychology at the University of Leeds approved this study (reference number: PSC-674; accepted on May 06, 2019).

### **3.2.4 Procedure**

The participants who chose to take part were asked for their preferred time for conducting the interview. Their consent was recorded over the telephone (in telephone interviews,  $n = 11$ ) or as a signed hardcopy before the beginning of each interview (if face-to-face,  $n = 3$ ). The interviews lasted approximately 45 min (range: 35–90 min). All the participants received a certificate for taking part. The first author (TG) conducted the interviews. She is a PhD candidate in psychology and was trained in qualitative interviewing.

### **3.2.5 Data Analysis**

This study employed Braun and Clark's five-step framework for thematic analysis, including: 1) data familiarisation, 2) initial code generation, 3) searching for themes, 4) naming and definition, and 5) report production (Braun & Clarke, 2006). Two reviewers (TG and JJ who is a lecturer in psychology and HCPC-registered Clinical Psychologist) independently coded two transcripts and compared their results to enable triangulation of analysis. The remaining transcripts were coded by TG using the NVIVO programme. The themes were subsequently checked and refined in meetings of the researchers (TG, JJ, DOC, SB).

## **3.3 Results**

### **3.3.1 Participants**

Fourteen surgeons were interviewed (11 males: 78.57%; 3 females: 21.42%). Nine were consultants, and five were registrars (Table 3.1). The sample was ethnically diverse, with nine white participants, three who were mixed-race and two who were Asian. The participants had varying years of surgical experience ( $mean = 22.5$ ;  $SD=14.78$ ).

### **3.3.2 Thematic Analysis**

The first part of the analysis focussed on the responses to the question, "What are the main factors that lead to surgeon burnout?" The responses fell under five main themes: 1) rising to the challenge of surgical work, 2) interpersonal conflict at work, 3) greater demands than resources, 4) the challenge of work-life balance, and 5) the devastating impact of errors and poor patient outcomes (Appendix B.2).

**Table 3.1: Demographics of participants**

<b>Name</b>	<b>Gender</b>	<b>Grade</b>	<b>Speciality</b>	<b>Experience as surgeon</b>
Interview 1	Male	Consultant	Neurosurgery	25 years
Interview 2	Male	Consultant	Urology	45 years
Interview 3	Female	Registrar	Urology	5 years
Interview 4	Male	Consultant	Urology	40 years
Interview 5	Female	Registrar	Urology	10 years
Interview 6	Male	Consultant	Urology	19 years
Interview 7	Male	Consultant	Urology	33 years
Interview 8	Female	Registrar	Colorectal Surgery	7 Years
Interview 9	Male	Consultant	Ear, Nose and Throat	22 years
Interview 10	Male	Consultant	Ear, Nose and Throat	44 years
Interview 11	Male	Consultant	Neurosurgery	23 years
Interview 12	Male	Registrar	Neurosurgery	4 years
Interview 13	Male	Registrar	Neurosurgery	4 years
Interview 14	Male	Consultant	Plastic Surgery	39 Years

### **3.3.3 Thematic Analysis - Part One**

#### **3.3.3.1 Theme One: Rising to the Challenge of Surgical Work**

This theme captured the psychological challenge of working in surgery. Undertaking surgical work was described as requiring ongoing psychological adaptations, which some surgeons struggled with.

Some surgeons mentioned that they could not devote mental and cognitive attention to resolving challenges in their lives. This may have been due to a lack of knowledge regarding stress coping techniques or simply

overwhelming pressures: *“Excessive pressure which opposes our ability to cope, I guess” (Interview 13).*

The surgeons commented that they had high self-expectations, were dedicated to their work, and were perfectionistic. Some surgeons mentioned that these high expectations – expecting to be valued by others or expecting the work to become easier – led to disappointment when those expectations were not fulfilled. For example: *“For consultant surgeons, one of the things I have found is that you start off as a junior doctor and you think the higher up you go ... life will get a bit easier. And it doesn't” (Interview 14).*

Some surgeons mentioned that they need admiration from others and feel threatened when other people think negatively about their work: *“So the other bits which come into being a surgeon, they are blacked out. So your performance goes off and you are constantly feeling under threat and you become very defensive” (Interview 2).*

This need for admiration and fear of criticism led some to struggle with their emotions and self-concept. To compensate for this, some surgeons engaged in bravado. This bravado involved shows of boldness intended to impress or intimidate others and led some surgeons to be unable to confess their weakness or help themselves when they were struggling with difficulties : *“To be a surgeon seems to depend on a degree of arrogance and overwhelming self-confidence to allow you to do what we do. And, of course, that's a really double-edged sword” (Interview 4).*

### **3.3.3.2 Theme Two: Interpersonal Conflict at Work**

Any dispute involving two or more people is referred to as an interpersonal conflict. Some surgeons mentioned a variety of interpersonal conflicts in teamwork settings that led to burnout.

Some surgeons argued that conflict between their team members, such as incivility, caused them to be stressed and experience burnout. Sometimes, this was attributed to personality clashes with others: *“Sometimes, surgeons aren't very nice to each other. You know, they could probably be a bit kinder to each other. Surgeons can be quite elitist. And sometimes people, you know, forget just to be nice” (Interview 12).*

For other surgeons, the interpersonal challenges they described were due to working in teams of people with whom they were unfamiliar: *“When I started in ‘95 [as a] consultant, I had almost the same people with me for all my education. This is not the case anymore, and causes stress, which may lead to burnout of surgeons. Sometimes I can be impatient with stuff because you don’t know who supports you in the clinic”* (Interview 7).

Some surgeons faced stress when they felt that their team was unprepared for their work, which led them to take a higher level of responsibility and feel more burdened: *“Sometimes there could be some type of unreliability of the members of the teams”* (Interview 7).

Some surgeons did not receive sufficient appreciation from patients and management and believed this lack of appreciation was a cause of burnout: *“There is not much more work that you can do, especially with a little bit of lack of appreciation from colleagues or seniors. I think the main cause is lack of appreciation, it’s always the thing”* (Interview 11).

Some surgeons identified poor management style as a key cause of their burnout: *“There’s a few managers, most of them previously doctors who have become managers who ... have kind of sort of ridiculous management dictums ... and I think that that is pretty stressful”* (Interview 4).

### **3.3.3.3 Theme Three: Greater Demands than Resources**

Surgical work entails specific physical and mental demands, such as balancing a high workload and being on call. Such demands are some of the biggest issues causing surgeons to feel stress and burnout.

Some surgeons experienced multiple demands, such as paperwork, meetings, exams and calls – all of which placed pressure on them at work and made them feel that they could not control their heavy work demands. Other surgeons described long hours and lack of sleep: *“I was working almost 48 hours straight, and I was approached after I finished everything. I was asked to do a certain task, a certain work. In the early hours of one morning, after few hours of sleep, I was approached by some of my seniors that took a look. I can’t do anything anymore. I am overworked, I am tired”* (Interview 11).

Some surgeons believed they did not receive enough professional support, which made them feel that they were suffering alone: *“I don't think that we get enough support in clinics. You know, like doing the EPR. There's are so many issues there which we can understand that there is not enough support”* (Interview 7).

Some surgeons discussed the lack of resources in the hospital and the insufficient number of staff members, which meant that they faced more pressure at work: *“There's not enough infrastructure in the hospital. The infrastructure is not sufficient for the amount of work we need to do. There's not enough beds, not enough surgeons, not enough consultants. We're under-resourced and that contributes quite significantly”* (Interview 9).

#### **3.3.3.4 Theme Four: The Challenge of Work–Life Balance**

A lack of work–life balance led surgeons to feel that their life centred on work. Some surgeons reported they did not have time off for a holiday and had less time to rest, which negatively affected their wellbeing: *“Maybe a few days off here and there, but during at least the first three years of my neurosurgical training where I experienced rigour properly, there wasn't any remarkable holidays”* (Interview 11).

For some, the lack of time off work was so extreme that they felt their work pushed out any significant personal life: *“I didn't have much of a personal life. I was living in the hospital. It was work, work, work and wasn't really anything much”* (Interview 11).

When surgeons did experience challenges in their personal lives, such as family illness, their work allowed little flexibility, which contributed to burnout: *“I got personal issues as well at home, that did not make things easy. That add pressure”* (Interview 2).

#### **3.3.3.5 Theme Five: The Devastating Impact of Errors and Poor Patient Outcomes**

The devastating impacts that complications and medical errors could have and how these impacted patient treatment results increased surgeons' burnout: *“I think there was a lot of fear. And, I was at a point where I was junior. So, I didn't quite understand that complications happen no matter what*

*you do. And, a complication did happen. I didn't really know how to deal with it at that point in my career” (Interview 12).*

For some surgeons, the negative impact of complications was compounded by how this contributed to patient satisfaction, with dissatisfied patients further driving burnout: *“If patients aren't happy, though. No. Contribute even more to burnout” (Interview 3).*

The lawsuits that could arise in the wake of complications were also identified as a significant contributor to burnout: *“The other thing is it's very easy to start legal action because of all that. No. With [no-win, no-fee lawyers]. And so, patients are much more likely to take a legal challenge, even if their challenge is ridiculous because they know that they don't lose any money” (Interview 1).*

### **3.3.4 Thematic Analysis - Part Two**

The second part of the analysis focussed on how surgeons coped with burnout (Appendix B.3). These analyses revealed five main themes that captured the ways surgeons reported dealing with burnout. The first one involved cognitive restructuring by using a range of cognitive strategies; the second was seeking social support from others; the third consisted of considering stepping aside or down from the job; the fourth dealt with prioritising personal health; and the fifth involved maladaptive coping to deal with burnout.

#### **3.3.4.1 Theme One: Cognitive Restructuring**

Interviewees shared a range of cognitive strategies for coping with stress, including “switching off”, thinking of things they were grateful for and meditation. Some surgeons said they dealt with work stress by deliberately forgetting about work when they were not at work – separating their professional and personal lives: *“That's how most people try to switch off, and not focus on work when they're not at work. I think that's probably the key thing” (Interview 9).*

Some surgeons described practicing being grateful for what they had accomplished; focusing on what they had, rather than what they did not have:

*“I think you remind yourself why you are doing the job you are. And, be thankful of your job. So, I think that's easy to assume and take your job for granted, actually. But, you have to realise you are lucky to be in a position to have an insight into patients' lives, and have such a profound effect on them”* (Interview 13).

Some surgeons used meditation to change their thinking and reduce stress: *“I did the meditation. I think meditation that helped me because basically self-doubt”* (Interview 2).

#### **3.3.4.2 Theme Two: Seeking Social Support**

When struggling with stress or burnout, some surgeons looked for support from others to help them overcome difficulties. This type of help-seeking took different forms, such as talking about the problem, asking for support from others or finding a mentor. Some surgeons mentioned that a good way to reduce burnout was to talk about difficult situations: *“I tried to offload to some degree by talking to my parents. The more you talk, the more you feel a bit less stressed maybe. So, I would still call all this informal”* (Interview 13).

Some surgeons said they obtained support from their friends and family members outside of work, and this helped them deal with burnout: *“My wife still tries to support me to a degree”* (Interview 4).

Some surgeons reported that they received support from their colleagues, which helped them when dealing with workplace struggles: *“I remember when going and chatting to a couple of consultants in that department, where they kind of enlightened me to the point that the training period in your life is just deficits”* (Interview 11).

Some surgeons said they received formal support from a manager, which reduced their stress levels: *“The first thing I did was ... speak to my head of clinical services and say, look, I think there's a problem here ... we have a very good head of clinical services who was very happy not only to listen, but to actually try to do something about it and identify things”* (Interview 14).

#### **3.3.4.3 Theme Three: Stepping Aside or Down from the Job**



Some surgeons addressed their burnout by making changes to their working patterns. One surgeon in the study suggested that cutting back on work was becoming increasingly common in the profession: *“I cut my hours really only after the stressful things that passed me by”* (Interview 4).

Some surgeons stated that they have known people to change, or entirely leave, their jobs to remove themselves from the situation that was causing them to experience burnout: *“I was burnt out to a certain extent, and training to the point that I resigned, actually resigned. And then I came back at some stage. So, yes, I would say that I have experienced burnout”* (Interview 11).

#### **3.3.4.4 Theme Four: Prioritising Personal Health**

Another method surgeons used to manage their stress levels was by improving their physical and mental health through engaging in healthy behaviours. Some surgeons expressed a view that getting adequate sleep was integral to tackling burnout: *“I’m getting a good night’s sleep. I’m sure that helps”* (Interview 10).

Linked with this was the view that relaxation and taking ‘down time’ was an important factor in avoiding burnout: *“My evening is relaxing. I go home and do what I want to do. So, that’s really my relaxation”* (Interview 10).

Some surgeons talked about taking up hobbies, such as reading or walking, to get their minds off work: *“Another way I cope with stress is through following my day with my hobbies, go for a walk, or do some light exercises at the gym”* (Interview 7).

#### **3.3.4.5 Theme Five: Maladaptive Coping**

Despite all the above, some surgeons reported on others' unhealthy habits, although few mentioned their own. This can be described as an ‘open secret’ – something all surgeons knew about but rarely talked about in their experience. For some, this involved substance abuse (drinking alcohol, smoking and using drugs): *“There was a consultant in this hospital (who is anonymous) became alcoholic and then lost life. No one was aware of the issues he was going through as he never really mentioned it to anyone”* (Interview 7). *“I’ve seen a few surgeons turn to alcohol. I’ve seen a few*

*surgeons turn to drugs” (Interview 4). For others, smoking was used as a coping strategy: “I took up smoking, which is a stress relief” (Interview 12).*

### **3.4 Discussion**

This study had two aims: to explore the main factors that lead to surgeon burnout and to examine how surgeons cope with burnout at work. This study suggested that surgeons experience a range of stressors, including those which are intrinsic to their profession, such as the pressure of conducting surgery, alongside those which are interpersonal in nature and those which are organisational, such as a lack of resources. Specific themes included rising to the challenge of surgical work, interpersonal conflict at work, the issue of greater demands than resources, the challenge of work-life balance, and the devastating impact of errors and poor patient outcomes. The study also revealed various strategies that surgeons employed to cope with burnout, such as cognitive restructuring, seeking social support, stepping aside or down from the job, and prioritising personal health. Additionally, the study found that some surgeons used maladaptive coping methods like substance misuse.

One of the main elements leading to burnout in surgeons was a lack of psychological coping strategies, which relate broadly to personality factors. Several studies have found a link between surgeons’ personality traits and burnout (Alarcon et al., 2009; Cofer et al., 2018; Lin et al., 2016; Lindeman et al., 2017; Melchers et al., 2015). This suggests that individual-focused interventions which aim to develop psychological coping strategies could be useful for surgeons. This is supported by a previous systematic review which suggested that individual-level interventions were associated with small but significant reductions in burnout (Panagioti et al., 2017).

We also found relationships and communication between professionals play an essential role in surgeon burnout. The recent findings are consistent with three previous studies, reporting a strong link between negative interpersonal interactions and higher burnout in surgeons (Businger et al., 2010) and physicians (Rehder et al., 2020; Welp et al., 2019). This suggests that healthier work relationships can reduce burnout and indicates that

interventions which focus on improving interpersonal relationships within teams might be an effective avenue for future burnout research to investigate.

The present study also discovered that the issue of high workloads and the challenge of the work-life balance were important contributing factors to burnout. These elements have been consistently corroborated within the wider literature, where high workloads are one of the most consistent predictors of burnout (Györfy et al., 2016; Nishimura et al., 2014; Watson et al., 2019). For example, one study in junior doctors found a greater general workload, the unpredictability of the work schedule, and a lack of necessary technical equipment were related to a higher level of burnout (Gander et al., 2007). This indicates that burnout interventions should focus on ways to reduce surgeons' workloads, for example, by providing adequate clerical and administrative support.

We identified that a decisive factor in burnout is adverse patient outcomes. This result substantiates a previous study which found burnout was independently associated with having experienced a recent malpractice suit (Balch et al., 2011). In addition, some surgeons struggled with feelings of guilt over patient complications (Lu et al., 2020). One possibility is that interventions which psychologically prepare surgeons for the occurrence of adverse events, malpractice suits and poor patient outcomes could be beneficial. One such intervention has been tested in a pilot study in multidisciplinary healthcare professionals, which included obstetrics and gynaecology registrars (Johnson et al., 2021). The results were promising but further controlled studies are needed to establish whether this intervention is effective.

In terms of coping strategies, we found that seeking support and leaving the role were two ways in which surgeons reported dealing with burnout. This information could be used to inform the development of interventions. For example, organisations could improve the support they provide by embedding this either formally, for example in the form of mentoring, or informally, by supporting the development of natural social relationships via the provision of social events. Previous research indicates that mentoring could be useful for reducing surgeon burnout (Johnson et al., 2021), but higher quality studies

are needed. Similarly, organisations could offer workload reduction to surgeons who are reporting burnout, to reduce the need for resignations.

We also noted that some surgeons suffering from burnout used unhealthy behaviours, such as substance misuse, to cope. Similar findings have been reported in previous studies in healthcare staff (Maunder et al., 2006; Rath et al., 2015). These findings are also consistent with another study that found surgeons who feel stressed are more likely to use illicit and prescription drugs for cognitive or mood enhancement (Franke et al., 2013). Individuals working with surgeons reporting burnout should be aware of this risk and signpost surgeons to useful avenues of support, for example, the Practitioner Health Programme for surgeons in the UK (O'Connor et al., 2020).

Finally, we are aware that the current study was limited by a small number of female participants (three women). As women surgeons are five times more likely to report burnout than their male counterparts, future research should be targeted on this group specifically (Sutherland et al., 2021). In addition, for participant selection and recruitment, only the first author attended surgeon meetings with different specialities and conducted the interviews with surgeons. Therefore, it is possible that this might cause some self-selection bias. Nevertheless, the research team felt it was important to ensure a consistent approach was adopted throughout. We also recognise that qualitative interview designs have limitations; in this case, we relied on surgeons' subjective, individual reporting of their experiences. As such, it is possible that surgeons did not report information they found difficult to discuss or that they felt was not appropriate to disclose. Moreover, we are aware that the existing findings did not consider the impact of the COVID-19 pandemic or its associated stressors on UK surgeons (Al-Ghunaim, Johnson, Biyani, & O'Connor, 2021).

The qualitative study on surgeon burnout's causes and treatments can shed light on the issue. Quantitative tools like surveys or standardised questionnaires may not capture surgeons' experiences. This study uses interviews to better understand surgeon burnout and possible treatments. This study may also help design surgeon burnout interventions and methods to promote surgeon well-being and patient care. Understanding the distinct

characteristics contributing to burnout in this demographic allows interventions to target these aspects and fulfil surgeons' needs.

In conclusion, surgeons are highly likely to experience burnout. This burnout is driven by factors which are intrinsic to surgical work, as well as factors which are interpersonal or organisational in nature and amenable to interventions. Surgeons use a variety of tactics to deal with burnout, including both healthy strategies such as seeking support and prioritising personal health, alongside unhealthy habits such as substance misuse. Organisations, surgeons, and psychological specialists should collaborate to provide more effective interventions, which may, in turn, improve the retention of surgeons.

## **Chapter 4 : How UK Surgeons Experience Burnout and the Link between Burnout and Patient Care: A Qualitative Investigation**

This chapter has been published: Al-Ghunaim, T., Johnson, J., Biyani, C. S., & O'Connor, D. B. (2022). How UK surgeons experience burnout and the link between burnout and patient care: A qualitative investigation. *Scottish Medical Journal*, 67(4), 197-206.

### **4.1 Introduction**

Burnout syndrome is characterised as a state of emotional weariness, depersonalisation, and a sense of personal failure that eventually leads to a loss of productivity at work (Maslach & Jackson, 1981). According to a recent systematic review and meta-analysis of 89 independent studies, surgeons report higher levels of burnout than their non-surgical peers (Prentice et al., 2020). In addition, compared to other medical professionals, surgeons are less likely to seek help (Gerada & Jones, 2014).

Concerning, another recent systematic review and meta-analysis with a total of 27,248 surgeons found burnout was linked to a higher chance of making a surgical or medical error (Al-Ghunaim, Johnson, Biyani, Alshahrani, et al., 2021). The review also investigated professionalism, which can be understood as the behaviours of professionals. While the professionalism outcome factors were too varied for meta-analysis, a narrative synthesis of these revealed a relationship between high burnout and a higher likelihood of losing temper, malpractice litigation, and a lack of empathy (Al-Ghunaim, Johnson, Biyani, Alshahrani, et al., 2021). Taken together, these findings indicate that burnout in surgeons could have implications for patient care and that addressing surgeon burnout may be one route to delivering higher quality, safer patient care.

There has been a growing literature investigating rates of burnout in surgeons (Bartholomew et al., 2018; Dimou et al., 2016; Pulcrano et al., 2016) and the factors which are associated with medical errors (Prins et al., 2009; Qureshi et al., 2015; Sulaiman et al., 2017). However, while the relationship

between burnout and patient safety is now established, the mechanisms underlying this relationship are unclear. Understanding this could advance the science of burnout and help identify areas where burnout interventions could usefully be delivered to both reduce surgeon burnout and diminish the risk of poor patient care in response to burnout. Qualitative investigations are particularly useful when seeking to understand complex relationships between variables, but few qualitative studies have been conducted into surgeon burnout, and these have focused on the drivers behind burnout (Lu et al., 2020). As such, the present study focuses on; 1) understanding the experience of burnout from the perspective of surgeons and 2) exploring the relationship between surgeon burnout and the quality and safety of patient care.

## **4.2 Methodology**

### **4.2.1 Research Design**

This study used a qualitative approach, namely semi-structured face-to-face or telephone interviews, to gain an in-depth understanding of the topic and to acquire first-hand perspectives of surgeons' experiences. The data used in this publication were part of a larger study that looked into the relationship between burnout and the patient care (Al-Ghunaim et al., 2022). The study followed to the SRQR (Standards for Reporting Qualitative Research), which consist of 21 elements (O'Brien et al., 2014).

### **4.2.2 Interview Creation**

A proforma was used to collect data on the participants, including their grade, speciality, number of years as a surgeon, and the type of hospital they worked in. The whole interview schedule (Appendix B.1) was divided into three sections: 1) burnout definitions and experiences 2) contributors to burnout and coping mechanisms, and 3) how burnout may impair patient care quality and safety. The current research focused on the data from the first and third sections.

### **4.2.3 Data Collection**

Purposive sampling was used, which is a technique that is frequently used when a diverse sample is required (Martínez-Mesa et al., 2016).

Because burnout was expected to differ between specialisations, the sample included surgeons from a variety of specialties with varying levels of expertise. The first author spoke at four surgeon gatherings in various specialties working in the UK, discussing the study in general and asking surgeons who wanted to participate in an interview to provide their contact information. The information was also gathered through social media platforms such as Twitter, with doctors from a variety of surgical specialties from throughout the UK being urged to take part in the interview. Five tweets with the hashtags "surgeons," "UK," and "NHS" were sent out at different times as part of the Twitter campaign.

This study had 14 participants and yielded a large amount of data to meet the study's objectives. In addition, the number of participants followed the usual guidelines for sample size in terms of data saturation and information power (Malterud et al., 2016). To preserve confidentiality, the interview was recorded and then removed from the recording equipment within 72 hours. The data was collected between August 8, 2019, and January 15, 2020.

#### **4.2.4 Ethical Approval**

The ethics committee of the School of Psychology at the University of Leeds approved this study (reference number: PSC-674; accepted on 06/05/2019).

#### **4.2.5 Procedure**

Participants who chose to participate were asked when they would like the interview to take place. Their consent was documented over the phone (n=11 for telephone interviews) or as a signed hardcopy prior to the start of each interview (n=3 for face-to-face interviews). The interviews lasted 45 minutes on average (range: 35–90 minutes). For taking part, each participant received a certificate.

#### **4.2.6 Data Analysis**

Braun and Clark's (2006) five-step paradigm for thematic analysis was used in this study, which included 1) data familiarisation, 2) initial code



development, 3) theme searching, 4) name and definition, and 5) report production (Braun & Clarke, 2006).

This type of analysis was chosen because it could yield unexpected insights into the factors that contribute to surgeon burnout and how they cope with it. Two reviewers (TG, a psychology PhD candidate, and JJ, a psychology lecturer, and HCPC-registered Clinical Psychologist) coded two transcripts separately and compared their results to enable triangulation of analysis. TG coded the remaining transcripts. The themes were then double-checked and fine-tuned at researcher meetings, including the whole team (TG, JJ, DOC, SB).

## **4.3 Results**

### **4.3.1 Participants**

A total of 14 surgeons were interviewed (11 males: 78.57 per cent; 3 females: 21.43 per cent). There were nine consultants and five registrars (Table 3.1, page 44) Nine white participants, three mixed-race participants, and two Asian participants made up the ethnically diverse sample. The participants' surgical experience ranged from 22.5 to 14.78 years (*mean*=22.5; *SD*=14.78).

### **4.3.2 Thematic Analysis - Part One:**

The first section of the analysis focused on the responses to the question, "How does burnout affect surgeons personally?" Findings were grouped under three main themes: 1) Burnout is common but frequently not recognised nor understood, 2) Burnout is a personal crisis, 3) When burnout creates vulnerability at work (See appendix C.1).

#### **4.3.2.1 Theme one: Burnout is Common but Frequently not Recognised nor Understood.**

This theme captured that although surgeons commonly recognise burnout in others, paradoxically, they struggle to recognise it in themselves until it is severe.

Some surgeons regarded burnout as a continuum or spectrum. Along the trip, there are various but distinct stops, each of which builds on the previous one: " *I think we all experience it to varying degrees. I experienced*

*burnout in all of my training*" (Interview 11). *"Yes, sometimes I was exhausted and tired, but I did not think that I lost focus lost interest"* (Interview 7).

Working as a surgeon can be demanding, with early starts and late finishes, as well as increased duties. This led some surgeons to describe emotional exhaustion and burnout as a common affliction: *"I think Surgeons are more affected by burnout because of the nature of their work. Other specialties in medicine, there is evidence of burnout, there is a chance of burnout but because of the stress of the job as it is in surgical specialties. The burnout become much more prominent for us and much more often"* (Interview 2).

Although burnout was described as common, some surgeons were not fully aware of whether they were burned out or not. This was possibly because of a lack of awareness of the burnout concept, or probably because some surgeons had a lack of insight into themselves and were not aware of their feelings: *"Maybe sometimes subconsciously, without realising that they are burnt out. I think it can be overlooked sometimes"* (Interview 11). *"No, I think surgeons are not very good at analysing themselves. So, I think they probably carry on and probably don't recognise things. Or maybe just a human thing. But, I think surgeons are particularly bad at, probably just continuing despite. Because we're driven by the work and the need to do things. And the fact we've got this job that we have to keep doing and can't just stop"* (Interview 10).

Some surgeons failed to understand burnout and thought that wellbeing was a life without problems or issues: *"Wellbeing, in my definition, is the feeling that you are working without stress"* (Interview 11).

Some surgeons felt that unless it was having a serious impact on their work, they were not experiencing burnout. Believing that burnout meant extreme suffering, some surgeons missed the shades of grey—the lower ends of the burnout spectrum. *"I expected my directors to give some advice as to how I can manage the situation, because I didn't I didn't recognise at that time that I was under a lot of stress"* (Interview 5).

Sometimes, surgeons said that when they had identified that they had burnout, they ignored it and disregarded the issue of burnout: *"They either*

*person try to ignore or just think we surgeons doesn't happen to us" (Interview 1).*

#### **4.3.2.2 Theme Two: Burnout is a Personal Crisis.**

The experience of burnout among surgeons affected them socially, which included them isolating themselves, expressing feelings of depression, and easily getting angry. As a result of burnout, their social relationships were also affected. Some surgeons mentioned that when they faced burnout, they tended to isolate themselves, lose their interest in social contact, and recoil into themselves: *"Some people will become more reclusive and avoid all social events. (Interview 13).*

Some surgeons described the effect of burnout as having depression: *"I think it can lead to depression" (Interview 12).*

Some surgeons described that burnout led them to easily lose their temper with their patients. Many surgeons also stated that they expressed their anger through interactions with their colleagues/co-workers: *"I did have one thing where I told somebody to stop working on the computer and come on help me please. I got cross at one moment. That was it. I apologised immediately" (Interview 10).*

#### **4.3.2.3 Theme three: Burnout Creates Vulnerability at Work.**

Some surgeons argued that when they have burnout, it has a negative effect on their work. They revealed that the problem of burnout has increased in the years and months prior to the time of the interview (which was before the COVID pandemic). In addition, surgeons seemed to be more comfortable talking about past experiences of burnout than their present feelings relating to burnout.

Some surgeons mentioned that they suffered more from burnout during their training, which they considered a very stressful time: *"I was burnt out to a certain extent, and training to the point that I resigned. I experienced burnout in all of my training" (Interview 11).*

Some surgeons stated that the problem of burnout had increased over time, linked with policy changes: *"I think that especially with, you know, changes in pension law and so on, our careers are being made to be longer and longer than previously they were. And I think that that means you're going*

*to have to deal with more change towards the end of your career” (Interview 4).*

Many surgeons were more open and felt more comfortable talking about previous burnout experiences rather than new ones. As a result, surgeons rarely disclosed current concerns, possibly due to the vulnerability such a disclosure may have generated: *“The single most stressful event I've had was a complaint to the fitness-to-practice at GMC, by a patient. A lot of years ago. Probably 15 years ago” (Interview 4).*

Another surgeon also mentioned this: *“Like I said, this was the main event in my career, where I experienced burnout in a true major form, back in 2000” (Interview 11).*

### **4.3.3 Thematic Analysis - Part Two:**

The second section of the analysis focused on the responses to the question, how does burnout affect surgeons providing care? Findings fell under four main themes: 1) the effect of burnout on surgeon-patient relationships and surgeon-patient communication, 2) patient safety “burnout increases the risk of errors”, 3) burnout affects staff relationships “burnout negatively affects colleague interactions or teamwork”, and 4) burnout makes surgeons less motivated to improve (See Appendix C.2).

#### **4.3.3.1 Theme One: Burnout Reduces the Quality of Surgeon-Patient Relationships.**

Many surgeons described how burnout affected surgeon-patient relationships. For example, they described that when surgeons are suffering from burnout, they tend to avoid contact with patients in order to avert confrontations and protect themselves from the stress of these types of interactions: *“ If I'm stressed about this patient, I want to go and try. I am more worried about it, you know what I mean? I want to see them more. But, I'm not sure that's a common and it's certainly not a universal reaction. I've been aware of something that colleagues do when things go wrong. They sort of turn their backs on the situation.” (Interview 4)*

*“Obviously you become very defensive and yourself, whatever you want to do will not be able to do. And. That makes you feel that you are not complete. So it makes you feel a bit shaky.” (Interview 2).*

However, some surgeons reported that this strategy could backfire, with some patients becoming increasingly angry if they did not see them: *“That can help people tend to be more short or angry or cut corners. Yes, definitely”* (Interview 3).

To manage the stress of these difficult interactions when they were feeling burnt out, some surgeons described making efforts to reduce this issue and help their relationships with patients by trying to relax before seeing them: *“I just make sure that before I interact with the patient in any way that I am in a calm situation. And if I think I'm not, then I will take a couple of minutes out, have a coffee or something as a coping mechanism”* (Interview 14).

#### **4.3.3.2 Theme Two: Patient Safety “Burnout Increases the Risk of Errors”**

This theme captured the association surgeons identified between burnout and an increased risk of making wrong decisions, medical errors, note-keeping errors or being unaware of or missing complications.

Some surgeons described how burnout could lead to indecisiveness or making incorrect decisions. They found this a concerning impact of burnout, because, as surgeons, they recognised that their decisions could have direct and significant effects on patients. Making the wrong decisions could lead to a patient safety incident: *“When I was very tired, I wasn't as quick to make decisions as well as I normally would [be]”* (Interview 5),

When burnout led to patient safety incidents, surgeons described feeling emotionally distressed and experiencing a sense that they had lost control: *“I felt that I don't want to be part of an unsafe practice, basically, and I resigned. Because it becomes unsafe, basically. It's not healthy for the surgeon and it becomes unsafe for patients as well”* (Interview 11). *“I realised that I wasn't recognising that this was happening to me. And surgeons have a way of trying to just deal with things on our own. We tried to solve our own problems. And essentially, I think there comes a point where all of these things are happen and you have a straw that breaks the camel's back, so to speak. So you sort of you end up having an incident in theatre”* (Interview 14).

Inadequate note keeping was also reported to be another consequence of surgeon burnout with the potential to negatively impact patient care: *“When*

*people not interested probably, they lazier and note do as much” (Interview 3).*

However, while some surgeons experienced distress in response to incidents which occurred when they were burnt out, others reported caring less, feeling less concerned about patients’ wellbeing and reduced learning from complications: *“You’d be less bothered by complications. I’d be less likely to reflect on the situation and think about the next time” (Interview 13).*

Recognising the link between burnout and less safe patient care, some surgeons used a double-checking strategy to try to protect their patients: *“Well, I think certainly took extra time. I spent a lot longer with patients trying to explain stuff, than I normally would have done. Just cause it was taking me longer to explain basically. And, then it’s just a case of checking and double checking, triple checking your notes, decisions, et cetera, that you actually documented the right thing, listed the right person for the right stuff. It’s a case of double checking things” (Interview 5).*

#### **4.3.3.3 Theme Three: Burnout Affects Staff Relationships “Burnout Negatively Affects Colleague Interactions or Teamwork”**

This theme captured the association between burnout and teamwork. Some surgeons described how burnout impaired their communication with their colleagues and caused them to lose their temper more frequently with colleagues: *“You’re more likely to get angry at your colleagues or patience is shorter” (Interview 12).*

When surgeons felt burnt out, some described using ego-defence mechanisms to become more aggressive in order to protect themselves: *“ Everyday life brings something that you will not always know how to cope with it, therefore one needs to be prepared and have various mechanisms to cope. Makers of defence mechanisms to fight for that sort of thing” (Interview 7).*

However, other surgeons described drawing on their teams when they felt burnt out, to mitigate the risk that their burnout could lead patients to receive poorer quality or less safe patient care. For example, one surgeon reported discussing cases with fellow team members rather than making decisions alone, recognising that their decision-making capacity may be reduced and they may need external support because of experiencing

burnout: *"As I said, about having colleagues to be able to discuss cases with. If you discuss with colleagues that are understanding, then they can give you advice and point out areas where you might have to arrange a particular test or a way of doing things differently. It's about having good communication with your work colleagues, I think"* (Interview 9).

#### **4.3.3.4 Theme Four: Burnout Makes Surgeons Less Motivated to Improve**

This theme described how burnout made some surgeons less motivated to improve and less open to learning; as a result, when they had burnout, some surgeons described themselves as having less development potential and were less motivated to improve: *"So, when it's not perfect, usually I'll think about, maybe I'll change that and make small tweaks rather than big changes. So, I think it's all about thinking how you could be bothered about even the small complications, so that you can perfect it. So, if you are burned out, you don't think of that. It's about getting home quicker"*. (Interview 13).

Whereas others became less open to learn: *"I think in terms of interacting and learning from other colleagues"* (Interview 13).

## **4.4 Discussion**

This study aimed to answer two specific questions. Firstly, how does burnout affect surgeons personally, and what is the experience like for them? Secondly, how does burnout affect the care that surgeons provide in the UK? Three main themes were identified as being important in surgeons' experience of burnout: 1) burnout is common, but it is frequently unrecognised or misunderstood, 2) burnout is a personal crisis, 3) burnout creates vulnerability at work. In addition, four areas were revealed relating to the effect that burnout has on the care that surgeons provide: surgeon-patient relationships, patient safety, and staff relationships (burnout negatively affects colleague interactions or teamwork). In addition, burnout makes surgeons less motivated to improve.

These findings support studies that indicate that burnout is a common problem in surgeons (Bartholomew et al., 2018; Dimou et al., 2016; Pulcrano et al., 2016). Also, our data support a similar finding reported by Gerada and Jones, which found that surgeons are less likely to seek help than other

medical professionals (Gerada & Jones, 2014). The current study highlights that some surgeons find it difficult to recognise burnout in themselves and when they claimed that after recognising that they were burnt out, they neglected the problem. This may be considered as a way of escaping their negative feelings by ignoring whether there is a problem or not, so as to protect their ego. Similarly, these findings are consistent with larger studies that reported burnout has been linked to a number of negative personal outcomes of surgeons, including a link to greater levels of depression (Faivre et al., 2018; Govardhan et al., 2012; Lebares et al., 2018; Williford et al., 2018) and anxiety (Lebares et al., 2018).

These findings also support the studies which described that trainee surgeons have a significantly higher risk for burnout than attending surgeons (a physician who is board-certified or board-qualified in surgery) in a variety of specialties (Gandhi et al., 2018; Prentice et al., 2020; Pulcrano et al., 2016). In addition, surgical trainees have been found to be at a higher risk of burnout than consultants or attending surgeons (Pulcrano et al., 2016; Sargent et al., 2009). A systematic review carried out by Galaiya, Kinross and Arulampalam showed that burnout levels are higher in people who are less experienced (Galaiya et al., 2020). Therefore, there is clearly a need for more and higher-quality studies investigating burnout treatments in surgeons and surgical trainees (Johnson et al., 2021).

The second question this study attempted to answer was: how does burnout affect the care that surgeons provide? These findings support studies that have found that burnout has a negative impact on patient satisfaction and surgical professionalism (Dimou et al., 2016). Similarly, a systematic review reported that surgeon burnout affects surgeons' professionalism, including a higher risk of loss of temper and malpractice suits and lower empathy (Al-Ghunaim, Johnson, Biyani, & O'Connor, 2021). Nine separate studies and the present study suggest significant links between surgeon burnout and patient safety (Coombs et al., 2020; Faivre et al., 2018; Hewitt et al., 2021; Kassam et al., 2021; Klein et al., 2010; Qureshi et al., 2015; Shanafelt et al., 2010).

The present study also extends existing knowledge by revealing that burnout can have a negative effect on collegiate interactions and teamwork,



similar to that of Copeland (2021), who also described that burnout significantly affected surgeon communication skills (Copeland, 2021). In addition, our results add to existing knowledge by identifying that burnout may make surgeons less motivated to improve. This is in line with findings reported by Yavari, Ismaeli, and Rezaie (2013), who highlighted a significant relationship between overall burnout and motivation (Yavari et al., 2013).

#### **4.4.1 Implications**

The current study also has implications for burnout interventions. Most interventions are aimed to prevent rather than treat mental illness, and most research is related to physicians in general rather than specific specialisations or career stages (Yavari et al., 2013). The method in which interventions are implemented appears to be critically important. The mentality and mind-set of pragmatic surgery professionals may be more compatible with an intervention approach that focuses on "what can be done" to deal with stress and burnout at work (Johnson et al., 2021). The findings from our study suggest interventions should be designed to be low stigma as we found that surgeons were reluctant to talk about current burnout. So as a result of this should Perhaps 'resilience-building' training would be less stigmatising than interventions presented as 'burnout support' interventions and be more acceptable to surgeons. Similarly, our study indicates that surgeons may not recognise the earlier stages of burnout. Perhaps interventions should focus on awareness-raising to help surgeons identify when they are experiencing work-related stress.

#### **4.4.2 Strengths and Limitations**

It is important to acknowledge the strengths and limitations of the current study. A strength of this study is that the qualitative methodology used provides a deep insight into how surgeons experience burnout and its effect on them. Another strength is that surgeons from different surgical specialty and of diverse grades were approached. Even though many quantitative studies have been carried out relating to surgeon burnout and medical errors (Prins et al., 2009; Qureshi et al., 2015; Sulaiman et al., 2017), few contribute towards a better and richer understanding of this problem.

However, this study does have some limitations. One of these is that

there was a gender imbalance within the sample, with only three women were interviewed, as opposed to 11 men. According to Sutherland et al.,(2021) female surgeons are five times more likely to report burnout when compared with males (Sutherland et al., 2021). Future research ought to try to ensure that equal numbers of male and female surgeons are recruited. A second limitation is that the study relied wholly on one-to-one interviews, rather than including focus groups. This approach was chosen in order to enable flexibility in the times when interviews were conducted and to reduce the burden of the study for surgeons. It was also chosen to ensure privacy and confidentiality for participants. However, a previous study on general practitioners used focus groups and found this to be a rich data collection method (Hall et al., 2020). Future qualitative research in surgeons may benefit from also including focus groups, alongside interviews.

In conclusion, this study concentrated on key themes relating to surgeons' burnout experiences: their understanding of burnout, how they cope with it, and how it affects their relationships with others. Four specific areas linked to surgeon burnout were also identified: how it affects relationships with patients, interactions and teamwork, patient safety, and surgeon motivation. Our findings suggest that hospital managers need to take action to reduce burnout in order to ensure that patients receive the best care possible and to reduce medical errors. More preventive intervention programmes are needed to help surgeons understand and recognise the problem of burnout and improve their wellbeing to help improve patient safety.

## **Chapter 5 : Burnout and Patient Safety Perceptions Among Surgeons in the United Kingdom During the Early Phases of the COVID-19 Pandemic: A two Wave Survey**

### **5.1 Introduction**

Rates of burnout are high in physicians and have increased following the onset of the COVID-19 pandemic. In a United Kingdom (UK) annual training survey of trainee physicians, 44% of the 63,000 respondents reported having high or very high levels of burnout (GMC, 2021). Concerningly, studies in surgeons indicate that they experience higher burnout than most other medical specialities (Shaikh et al., 2022; Wright et al., 2022).

The causes of high stress and burnout in surgeons are varied and include financial insecurity, fear of lawsuits, peer pressure, and emotional trauma due to patient deaths (Guest et al., 2011). For example, one qualitative study found that interpersonal conflict at work, greater demands than resources, the challenge of work-life balance, and the devastating impact of errors and poor patient outcomes contributed to surgeons' burnout (Al-Ghunaim et al., 2022). In addition, other quantitative studies have reported that the higher levels of burnout among surgeons are associated with several elements such as greater overall working hours (Johnson et al., 2021; Kinslow et al., 2020), not being involved in decision-making (Coombs et al., 2020) and lack of the training (Chati et al., 2017).

Several studies have indicated that high stress and burnout in healthcare professionals are associated with the delivery of poorer patient care. A recent systematic review and meta-analysis of physicians suggested that burnt-out physicians were at twice the risk of being involved in a patient safety incident (Hodkinson et al., 2022). This pattern has also been observed in surgeons specifically. In a recent systematic review of studies in surgeons, burnout was associated with a 2.5-fold higher risk of involvement in medical or surgical errors. However, only 14 studies were identified in this review, and the majority were conducted in the United States (nine of the 14 were American, four were European, and one was Chinese) (Al-Ghunaim, 2021). None of these studies

were conducted in the UK, therefore, there is a need for further evidence to understand the strength and generalisability of this relationship in surgeons in the UK.

Furthermore, while there is a burgeoning literature investigating associations between burnout and poorer patient care, the direction of this association is unclear. Even large, robust surveys tend to be cross-sectional, only providing a snapshot of participants at a single time point (Klein et al., 2010; Prins et al., 2009; Shanafelt et al., 2010; Tan & Chen, 2019; Walocha et al., 2013). Few studies have sought to understand whether high burnout predicts subsequent poorer patient safety, whether poorer patient safety leads to high burnout or indeed, whether the relationship is bidirectional. This information could help inform where interventions to improve burnout and patient safety should focus. As such, there is a need for a study which tracks surgeons to elucidate the nature of these associations. There is also a need to better understand how burnout has changed in surgeons over the course of the pandemic.

This study aimed to address these gaps. The main aim was to investigate associations between surgeon burnout and patient safety perceptions at the same time-point and over time. The second aim was to examine whether burnout fluctuated across the early phases of the pandemic in individual surgeons. The study aimed to answer three specific research questions:

- 1) Is burnout associated with patient safety outcomes measured at the same time point?
- 2) Is the relationship between burnout and patient safety a two-way, reciprocal relationship over time?
  - a) Does burnout at Wave 1 predict patient safety perception at Wave 2?
  - b) Do patient safety perceptions at Wave 1 predict burnout at Wave 2?
- 3) Did burnout fluctuate across the six months between 30 June 2020 and 5 January 2021?

## **5.2 Methodology**

### **5.2.1 Design:**

This research used a longitudinal questionnaire design with data collection at two time points (at baseline, 'Wave 1'; and again 6 months later, 'Wave 2'). Six months can be a sufficient time for changes between the first wave and the second wave. Questionnaires were made available both online, and as hard copy paper versions to optimise reach.

This paper reported findings from a two-wave survey. The dataset was divided into three groups for analysis: 1) cross-sectional group 1 contained data from surgeons who provided one survey response between 5 May and 30 June 2020, named "Group 1". 2) cross-sectional group 2 contained data from surgeons who provided one survey response between 5 January to 30 February 2021, named "Group 2". 3) the longitudinal group contained data from the participants who responded to both the first cross-sectional survey (5 May and 30 June 2020) and the second cross-sectional survey (5 January to 30 February 2021), named "Group 3". Each group had different participants.

### **5.2.2 Participants and Recruitment Strategy**

All practicing UK surgeons were eligible to take part, regardless of their specialty and whether they were trainees or consultants. Anyone outside that group was excluded, including those who were retired. To determine the appropriate numbers of participants to recruit, a priori power analysis was run for a correlation on G\*Power assuming 80% power and setting alpha at .05 with a medium effect size of 0.30 (Gignac & Szodorai, 2016). The G\*Power analysis indicated that the minimum sample size needed for the research was 82. Convenience and snowball sampling strategies were used to recruit participants. Using social media outlets (e.g., Twitter), surgeons and surgical trainees working in various surgical specialties across the UK were invited to participate in the survey, and 306 individual surgeons were contacted using an available networking email list. A five-day reminder was sent after the initial invitation.

### **5.2.3 Ethical Approval**

All potential participants were provided with information about the research study. Participants were informed that their information would be stored safely and securely and that they could withdraw their data up to two months after completing the survey. This study received ethical approval from the School of Psychology Research Ethics Committee at the University of Leeds on May 4th, 2020 (Ref: PSYC-34).

#### **5.2.4 Measures**

The questionnaires were completed by participants at Wave 1 and Wave 2. The same questionnaire was delivered in both waves. The survey comprised of three sections:

- 1) Demographics: age, gender, and ethnicity, number of years of experience as a practising surgeon and position, and speciality.
- 2) Surgeon burnout as evaluated by the Oldenburg Burnout Inventory (OLBI) (Demerouti & Bakker, 2008), and wellbeing by the General Health Questionnaire (GHQ-12)
- 3) Patient safety, which included a series of questions relating to the safety of their practice.

##### **5.2.4.1 Burnout**

The Oldenburg Burnout Inventory (Demerouti & Bakker, 2008) scale has eight disengagement items and eight exhaustion items. An example of disengagement is “over time, one can become disconnected from this type of work”; an example of exhaustion is “there are days when I feel tired before I arrive at work”. For each of the separate subscales, burnout was classified as: no exhaustion/disengagement = 0-17.59; mild exhaustion = 17.60-21.99; and severe exhaustion = 22-32. For overall burnout: no burnout = 0-35.1, mild burnout = 35.2-43.9, and high burnout = 44-64 (Björklund et al., 2013). The four-item Likert rating scale included the following options: Strongly Agree (1), Agree (2), Disagree (3), and Strongly Disagree (4). The OLBI score had a high level of internal consistency (Group 1: Cronbach’s  $\alpha = .88$ , Group 2:  $\alpha = .90$ , Group 3 first wave  $\alpha = .90$  and the second wave  $\alpha = .90$ ). Individually, both subscales had good internal consistency (Exhaustion, Group: 1  $\alpha = .85$ ; Group 2:  $\alpha = .83$ ; Group 3, first wave:  $\alpha = .87$  and second wave:  $\alpha = .88$ )

(Disengagement, Group 1:  $\alpha = .73$ ; Group 2:  $\alpha = .80$ ; Group 3, first wave:  $\alpha = .77$  and second wave:  $\alpha = .80$ ).

#### **5.2.4.2 General Health Questionnaire (GHQ)**

The GHQ-12 is a unidimensional scale of psychological distress that measures symptoms of anxiety, sadness, social dysfunction, and loss of confidence (Gao et al., 2004). Like other studies (Prudenzi et al., 2022; Russ et al., 2012), the current study used a four-point Likert scale where participants rated the presence of symptoms ("not at all"=0, "same as usual"=0, "more than usual"=1, "far more than usual"=1). Participants were grouped into four categories according to their GHQ-12 scores: asymptomatic (score 0), subclinical symptomatic (scoring 1-3), symptomatic (score 4-6), and very symptomatic (score 7-12). This scale had good internal consistency in the present study (Group 1:  $\alpha = .90$ ; Group 2:  $\alpha = .84$ ; Group 3, first wave:  $\alpha = .90$  and second wave:  $\alpha = .85$ ).

#### **5.2.4.3 Patient Safety and Safe Practitioner Measures**

Participants were asked if they had been responsible for any: a) adverse events (AEs) and/or b) near misses (NM) in the preceding three months (Yes or No responses). Participants rated the extent to which they felt they could provide safe care, dependent on work-related conditions. The statement was, "My practice is not as safe as it could be due to work-related factors/conditions" and participants responded on a five-point Likert scale ranging from 1 ('Strongly disagree') to 5 ('Strongly agree'). This is known as the 'Safe Practitioner' measure (Louch et al., 2017) and has been used in nursing studies where the scores were found to converge with other long-term patient safety measures (Louch et al., 2017).

#### **5.2.5 Data Analysis:**

We had two datasets from which we generated three groups – two cross-sectional for the participants who responded during Wave 1 or the Wave 2 but not at both time-points (Groups 1 and 2) and one longitudinal (Group 3), for the participants who completed questionnaires at both time-points. For Groups 1 and 2, eligibility and outliers were checked. Six cases from Group 1 and four cases from Group 2 were dropped for having only completed the demographic questions. The data were found to be missing completely at

random using Little's Missing Completely at Random (MCAR) test ( $Chi-square = 38.330$ ,  $df = 370$ ,  $p = .609$  for Group 1 and  $Chi-square = 31.450$ ,  $df = 21$ ,  $p = .660$  for Group 2). There was no missing data in Group 3.

To address research question 1: "is burnout associated with patient safety outcomes measured at the same time point?", Spearman's correlations were used to investigate associations between variables as the data were not normally distributed. To address research question 2: "do changes in burnout predict changes in patient safety perceptions over time?", residuals were checked and found to be roughly normally distributed, and the data was found to match the requirements of linearity and homogeneity of variance. Multiple regression was used to assess the link between 1) Wave 1 burnout and Wave 2 safety perceptions while controlling for Wave 1 safety perceptions, and 2) Wave 1 safety perceptions and Wave 2 burnout while controlling for Wave 1 burnout. Missing data were replaced with the column mean, as only 4% of data points were missing (Downey & King, 1998).

To address research question 3 (did burnout fluctuate across the pandemic?), a paired samples T-test was used to assess whether burnout, GHQ-12, and safe practice fluctuated between the Wave 1 and Wave 2 time points in Group 3. In all analyses,  $p < 0.05$  was considered as statistically significant.

## **5.3 Results**

### **5.3.1 Descriptive Statistics**

Cross-sectional Group 1 included 102 participants with a mean age of 42.15 years ( $SD=10.58$ ), and cross-sectional Group 2 included 84 participants mean age of 43.06 years ( $SD=10.53$ ). The longitudinal group (Group 3) had 39 participants, with a mean age of 44.10 years ( $SD=11.23$ ). See Table 5.1 for full participants details.



**Table 5.1: Surgeons' characteristics in all groups:**

		<b>Cross-sectional 1 (Group 1)</b>	<b>Cross-sectional 2 (Group 2)</b>	<b>Longitudinal study (Group 3)</b>
<b>Total number of respondents</b>		108	84	39
<b>Mean age</b>		42.15 years (Range 31-66 years), SD10.58.	43.05 years (Range 25-70 years), SD 10.53	44.10 years (Range 27-65 years) SD 11.23
<b>Gender</b>	Male	68 (66.7%)	67 (79.8%)	25 (64%)
	Female	19 (18.6%)	17 (20.2%)	14 (36%)
	Other	1 (1%)	0	0
	Did not respond	14 (13.7%)	0	0
<b>Grade</b>	Consultants	62 (57.4%)	47 (56%),	23 (59%)
	Specialty trainees	27 (25%)	29 (34.5%)	11 (28.2%)
	Core surgical trainee	7 (6.4%)	2 (2.4%)	3(7.7%)
	Other	11.2 (10%)	5 (6%)	2 (5.1%)
	Missing	1 (1%)	1 (1.2%).	0
<b>Specialty</b>	Urology	51(50%)	56 (66.6%)	25 (64.1%)
	General surgery	12 (11.8%)	3 (3.6%)	2 (5.1%),
	Obstetrics and Gynaecology	9 (9.9%)	1 (1.2%).	1 (2.6%).
	Neurosurgery	7 (11.8%)	1 (1.2%).	1 (2.6%).

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Oral and Maxillofacial Surgery	6 (5.9%)	2 (2.4%)	1 (2.6%).
vascular surgery with colorectal	3 (2.9%)		3(8%)
HPB and Transplant Surgery	1 (1%).		
Plastic Surgery	1 (1%).	1 (1.2%).	1 (2.6%).
Transplant and Hepatobiliary Surgery	1 (1%).	2 (2.4%)	
Otolaryngologists		7 (8.3%)	2 (5.1%),
Trauma & Orthopaedics		6 (7.1%)	2 (5.1%),
Cardiothoracic Surgery		1 (1.2%).	
Laparoscopic and Upper GI Surgery		1 (1.2%).	
Maxillofacial		1 (1.2%).	
Hepatobiliary Surgery		1 (1.2%).	
Ophthalmology			1 (2.6%).
Missing	1(1%).	0	0

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### 5.3.2 Research question 1: Is Burnout Associated with Patient Safety Outcomes Measured at the Same Time Point?

#### 5.3.2.1 Group 1:

There was a significant positive relationship between overall burnout and safe practice perceptions ( $r = .309, p = 0.001$ ), and between GHQ and safe practice perceptions ( $r = .217, p = 0.021$ ) indicating that when burnout was higher, safety perceptions were poorer.

In addition, a significant positive relationship was found between higher burnout and a higher risk of reporting a near miss ( $r = .221, p = 0.020$ ), and a significant positive relationship between higher GHQ score and greater risk of a near miss ( $r = .232, p = 0.010$ ). For more details see Table 5.2.

**Table 5.2: Spearman's correlations in Group 1 (n=102)**

	1. Burnout	2. GHQ-12	3. Adverse event/s	4. Near misses	5. Safe practicing
1. Burnout	-				
2. GHQ-12	.769**	-			
3. Adverse event/s	-.039	.030	-		
4. Near misses	.221*	.232*	-.126	-	
5. Safe practicing	.309**	.217*	-.076	.311**	-

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### 5.3.2.2 Group 2:

In Group 2, there was a significant relationship between burnout and safe practice perceptions ( $r = .238, p = 0.021$ ), indicating that burnout and safe practice were related (Table 5.3). There was also a significant relationship between higher burnout and greater risk of a near miss ( $r = .228, p = 0.030$ ). There was no significant relationship between GHQ and safe practice ( $r = .142, p = 0.320$ ).

**Table 5.3: Spearman correlation Group 2 (n=84)**

	<b>1.Burnout Group 2</b>	<b>2.GHQ- 12 Group 2</b>	<b>3.Adverse event 2 months</b>	<b>4.near misses Group 2</b>	<b>5.Safe practicing Group 2</b>
<b>1. Burnout Group 2</b>	-				
<b>2. GHQ-12 Group 2</b>	.568**	-			
<b>3.Adverse event 2 months</b>	-.015	.117	-		
<b>4.Near miss 2 months</b>	.228*	-.086	-.043	-	
<b>5.Safe practicing Group2</b>	.238*	.142	.331**	.207	-

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### **5.3.3 Research Question 2: Is the Relationship between Burnout and Patient Safety a Two-way, Reciprocal Relationship?**

This question was investigated using the longitudinal group (Group 3) dataset. The question had two parts:

#### **5.3.3.1 Part One: Does Burnout at Wave 1 Predict Patient Safety Perceptions at Wave 2**

Age and gender were not significantly related to the burnout and patient safety perceptions, so they were not included in the multiple regression analysis.

In Step 1 of the analysis, Wave 1 burnout was a significant predictor for Wave 2 safe practice perceptions,  $F(1)=9.028$ ,  $p = .005$ , accounting for 19% variance (see Step 1 for the regression model in see Table 5.4) Thus, we

observed that the effect of Wave 1 safe practicing perceptions predicted burnout at Wave 2, but not when controlling for Wave 1 burnout (Table 5.4).

In Step 2, Wave 1 safe practice perceptions explained an additional 8% of the variance in Wave 2 safe practice perceptions, but the effect of burnout remained statistically significant,  $F(2)=6.965$ ,  $p = .003$ . Thus, we found that Wave 1 burnout not only predicted poorer Wave 2 safe practice perceptions, but it also predicted poorer safe practice perceptions when controlling for Wave 1 safe practice.

### **5.3.3.2 Part Two: Does Patient Safety at Wave 1 Predict Burnout Perception at Wave 2**

In Step 1, Wave 1 safe practice perceptions were a significant predictor for Wave 2 burnout,  $F(1)=6.179$ ,  $P=.018$  (see Table 5.4). Thus, we observed that the effect of Wave 1 safe practicing perceptions predicted burnout at Wave 2, but not when controlling for Wave 1 burnout (see Table 5.4).

However, in Step 2, when Wave 1 burnout entered the equation, burnout was a significant predictor  $F(2)=35.716$ ,  $P=.000$ , accounting for 52% variance, but safe practice perceptions were no longer significant  $B=.330$ ,  $P=.588$  (see Table 5.4) Thus, we observed that the effect of Wave 1 safe practicing perceptions predicted burnout at Wave 2, but not when controlling for Wave 1 burnout.

### **5.3.4 Research Question 3: Did Burnout Fluctuate Across the COVID-19 Pandemic?**

Compared with Wave 1 ( $mean=35.487$ ,  $SD=7.556$ ), Wave 2 burnout scores ( $mean=38.404$ ,  $SD=7.417$ ) were significantly higher ( $t=-4.034$ ,  $p<.005$  ( $-4.435--1.471$ ) indicating an increase in burnout over time.

**Table 5.4: A hierarchical linear regression model was used to determine whether burnout during Wave 1 predicted patient safety perceptions during Wave 2.**

Measure	Steps	Variables	B step 1	B step 2	R2 change for step	R- square.
<b>Patient safety perceptions at wave 2</b>	Step 1	Burnout T1	.066**	.047*	.196**	.196
	Step 2	Safe practicing T1		.273*	.083*	.279
<b>Burnout at wave 2</b>	Step 1	Safe practicing T1	2.164*	.330	.143*	.143
	Step 2	Burnout T1		.776**	.522**	.665

\*\* p<.001

\* p<.05

## 5.4 Discussion

Three main findings emerged from the current study. First, burnout was associated with poorer patient safety perceptions when they were measured at the same time point. Second, higher burnout predicted poorer patient safety perceptions over time. Third, burnout significantly increased over the six months between June 2020 and January 2021. These findings advance the literature in a number of important ways. First, they provide further evidence that burnout is consistently associated with patient safety perceptions in surgeons. Second, they indicate that the relationship between burnout and safety perceptions may be bi-directional, but that the influence of burnout on safety perceptions may be stronger than vice-versa. Third, they provide further evidence indicating an increase of burnout in surgeons following the onset of the pandemic.

There have been a number of studies investigating cross-sectional associations between burnout and patient safety in healthcare professionals (Klein et al., 2010; Prins et al., 2009; Tan & Chen, 2019; Walocha et al., 2013), but few have looked at associations over time. Such as a study by West et al. (2006) which aimed to determine the association between self-perceived medical errors and burnout among physicians in the US. The study found self-perceived medical errors were associated with high burnout. Furthermore higher burnout in all domains was connected with an increase in the probabilities of self-perceived inaccuracy in the following three months (West et al., 2006). This is in line with the present study which found evidence of a bi-directional association between burnout and safety perceptions, and a cross-sectional association between burnout and near misses but not with adverse events. This may be due to effect of COVID-19 on the cancel of the operations in the UK which may play in reduce the adverse event as there no a lot of operation as at the time of the study, as surgeons were asked by the Department of Health to cancel routine operations during the first wave of COVID-19 pandemic (Singleton et al., 2021).

Our finding that burnout increased over six months during the early phases of the pandemic is in line with a survey of physicians in Japan by Kannampallil et al. (2020). Their study found that 46.3% were experiencing high burnout before the COVID-19 pandemic with a further increase of 12% following the start of the COVID-19 pandemic. Furthermore, large national surveys have also begun to reveal evidence of increasing burnout. For example, the UK training survey (GMC, 2021), which included 63,000 trainee doctors found that 56% of them were suffering from high or very high levels of burnout, compared with 43% in early 2020 (GMC, 2021). The current study contributes to the existing literature by following participants during the first wave of COVID-19 and again six months later in early 2021, so making our estimations more accurate and less susceptible to bias. Replication studies can help to refine research methods and identify potential limitations or biases in the original study (Amir & Sharon, 1990). This can help to improve the reliability and validity of research findings.

### **5.4.1 Implications**

These findings emphasise the importance of providing effective burnout interventions in order to improve patient care. There are now local and national support systems in place, such as mindfulness programmes or the Confidential Support and Advice Service of the Royal College of Surgeons (2020). However, there is a need to increase awareness of causes and effects of burnout in surgeon ,as some surgeons neither recognise nor understand burnout (Al-Ghunaim et al., 2022). There is also a need to reduce stigma around help seeking for mental health. Moreover, there is a growing evidence-base that has shown that group-based acceptance and commitment therapy interventions are effectiveness for reducing general distress in healthcare professionals (Prudenzi et al., 2022), but a lack of evaluations of this approach in surgeons.

### **5.4.2 Strengths and Limitations**

This study has several strengths. First, it collected data using a two-wave approach. Second, it measured the relationship over time to provide evidence of longitudinal associations.

However, some limitations should be considered when interpreting the results, including a relatively small sample size, when conducting research with a limited sample size, it's important to recognise and solve potential difficulties. Researchers can guarantee their results are accurate and useful by ensuring the sample size is large enough, employing various metrics and methodologies, looking for outliers, and applying a cautious approach to repeated comparisons. Low sample size means that the problems associated with small sample size may apply, including low statistical power, capitalization on chance, common method variance, and a disproportional influence of outliers. Multiple analyses risk Type I errors in addition to small sample size difficulties. Type I errors involve rejecting a true null hypothesis. if the researchers employ a cautious strategy like the Benjamini–Hochberg (1995) method to reduce type I errors. This approach modifies multiple comparison p-values, reducing false positives, which this study did not do. Although it should be noted that we met the minimum sample size recommendations (Faber & Fonseca, 2014), The findings of this study and



other research indicate how crucial it is for surgical trainees to continue receiving support through resources, guidance, and psychological care after the COVID-19 pandemic.

This study's drawback lies in its employment of the OLBI as a measure of burnout. Al-Ghunaim et al.'s (2022) systematic review revealed that the MBI was the preferred instrument in studying burnout among surgeons. As a result, this study failed to take advantage of the opportunity to compare its data with that of the studies included in the systematic review.

Future studies, including a larger sample of junior surgeons, are necessary to comprehend causality, track trends, and promote the adoption of support and guidance at the national and local levels to protect the mental health of our future surgeons (Aziz et al., 2021; Kabir et al., 2021).

### **5.4.3 Conclusion**

To summarize, this study presents findings that support the connection between surgeon burnout and patient safety, suggesting that the relationship between these factors is reciprocal. Also, this study highlights the significant stress surgeons suffered during the first wave of the pandemic and the apparent increase in burnout. There is an urgent need for workplace support and mental health interventions to help surgeons deal with the challenges they face. Together, healthcare organisations, surgeons, and psychologists should offer more and better interventions to support surgeons.

## **Chapter 6 : The Psychological and Occupational Impact of the Coronavirus (COVID-19) Pandemic on UK Surgeons: A Qualitative Investigation**

This chapter has been published: Al-Ghunaim, T. A., Johnson, J., Biyani, C. S., & O'Connor, D. (2021). Psychological and occupational impact of the COVID-19 pandemic on UK surgeons: a qualitative investigation. *BMJ Open*, 11(4), e045699.

### **6.1 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 (Yang et al., 2020). 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 (World health organization, 2020).

The seriousness, scale and virulence of COVID-19 have had a major negative impact on people’s mental health (O'Connor et al., 2020). 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 (O'Connor. et al., 2021). In addition, the widespread outbreaks of infectious diseases, such as COVID-19, have been reported to cause public panic and mental illness (Bao et al., 2020). 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 (Li et al., 2020).

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 (Wang et al., 2021). 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) (Wang et al., 2021).

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 (Calhoun et al., 2020; Hunter et al., 2020; Iacobucci, 2020; Willan et al., 2020). A study that focused on the mental health of NHS workers during the COVID-19 pandemic found that healthcare workers experienced mild depression and increased levels of stress and anxiety (Choudhury et al., 2020).

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

A current rapid review and meta-analysis by Kisely et al. (2020), which sought to investigate the psychological effects of any emerging virus outbreak on healthcare workers, found that the staff who are in direct contact with infected patients were more susceptible to experience high levels of acute or post-traumatic stress and psychological distress (Kisely et al., 2020). Moreover, being lower in the staff hierarchy, or parent with dependent children, or having a vulnerable or sick family member were also determined

to be contributing risk factors for facing psychological distress. This review also ascertained that discrimination, disgust, stigma and lack of moral support for healthcare workers may also contribute to high levels of distress.

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

However, to the best of our knowledge, there has been no study on how surgeons have been affected by the current pandemic. Research is therefore urgently required concerning how the COVID-19 pandemic is affecting the mental health of surgeons to gain a clearer understanding in order to help inform future interventions and support plans (O'Connor et al., 2020). Therefore, the current study aimed to ask surgeons directly about the impact of the COVID-19 crisis on their work and home life.

## **6.2 Methodology**

### **6.2.1 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 5<sup>th</sup> May and 30<sup>th</sup> 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 (Statista, 2019). 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'. Information power is a concept used in qualitative research to determine the adequacy of the sample size in relation to the research question and the quality of the data being collected. It refers to the extent to which the data collected has the potential to answer the research question in a meaningful way. (Malterud et al., 2016).

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

### **6.2.2 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. This study preferred thematic analysis because of its theoretical flexibility and capacity to uncover unexpected insights by offering a comprehensive examination of the data. (Braun & Clarke, 2006). The thematic analysis also useful to answer the research question. The analysis framework developed by Braun and Clarke (2006) 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 (Braun & Clarke, 2006).

The second question, “How is this stress affecting you personally?” was also analysed following the approach of Taylor et al. (2010), 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.

## **6.3 Results**

### **6.3.1 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.

### 6.3.2 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 (See Appendix D.1).

#### 6.3.2.1 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 in terms of limited capacity: "*reduced capacity*"; "*At work ... limited capacity*". Furthermore, many comments mentioned capacity specifically in the context

of operative surgery for example: *“Reduced capacity for operative surgery”*.

- **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 for example: *“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”*.

Some comments mentioned reallocated workers performing work they are unfamiliar with for example: *“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 for example: *“I have had to work from home due to immunosuppressive medication”*.

By contrast, some respondents see this change as positive, as it makes the work easier for example: *“opportunity for more home working would be beneficial”*.

## **2) Workload and Lack of Work-Life Balance:**

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

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

### **6.3.2.2 Theme Two: Challenges to Professional Life and Development:**

This theme describes how COVID-19 pandemic has affected surgeons' performance at work and their experience of professional development.

**1) Impact on Surgeons' Performance.** Some surgeons commented about difficulties in planning and making decisions (e.g., *"It is intellectually tiring to make decisions"*). Many also mentioned about how COVID-19 affects their performance by making them less productive and slower at work *"Less productive and innovative"; "Work is mundane and slow."* In addition to difficulties in planning and lack of productivity, several comments relate to surgeons feeling tired and even exhausted during the period of COVID-19 crisis (e.g., *"Tired, often struggle to find motivation"*).

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

### 6.3.2.3 Theme Three: Management of Change and Loss in Personal Lives

This theme describes the effects of COVID-19 pandemic on surgeons' lives outside work.

- 1) **Childcare Issues.** Most remarks about how COVID-19 crisis affects surgeons' lives are about how surgeons struggle with childcare issues (e.g., *"Difficult having teenagers at home with school being closed"* and *"struggled with childcare"*).
- 2) **Family Life and Relationships.** Several participants expressed how, 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"*).

### 6.3.2.4 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"*).

- 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”*.

## 6.4 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 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 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 pandemic, 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 the COVID-19 emergency can affect the long-term delivery of surgical services and lead to cancellations and delays (Søreide et al., 2020). Similarly, Chadi et al. (2020) found that almost 27% of respondents mentioned interruptions in the delivery of surgical services.

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 (Jessop et al., 2020). 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 (Hojaj et al., 2020). 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 working conditions for surgical teams. Consideration must also be given to surgeons who have high-risk family members, such as elderly relatives, children and even other healthcare workers, all of which may contribute to higher levels of anxiety for surgeons themselves (Xu et al., 2020).

The second and third themes to emerge from this study relate to the challenges to surgeons' personal and professional lives and their development during the COVID-19 pandemic. From the perspective of training practitioners, adjustments to educational programs in response to this unexpected interruption should be put into place to minimize the disruption of the continuity of learning. In light of this, a lack of training is one of the main aspects of this theme that affects surgeons negatively. This result is consistent with a previous study of surgeons in Italy, which found that the COVID-19 pandemic had a negative impact on their educational programme, which includes a training component (Pertile et al., 2020). Furthermore, 80% of surgeons who participated in a survey in India reported that their learning had been adversely affected by COVID-19 pandemic (Mishra et al., 2020). Hence, training hospitals should take this into consideration and reassure trainees.

This study has implications for future research to formulate clear guidelines that compensate for cancelled training courses and lost time, which might help mitigate the stress currently experienced by surgeons and inform them how to reschedule training. This study also recommends virtual and simulation-based training during a pandemic. While surgeon training courses may require physical attendance due to their complexity, trainers should consider alternative methods (webinars and immersive technologies) to facilitate surgical training. Such adaptations have been universally tested as remote learning methods and have been deemed increasingly effective, even in the niche area of surgery (McKechnie et al., 2020). In lieu of lost opportunities to experience in-hospital training, virtual programs must be supplemented by in-hospital simulated skill training.

Besides the training setting, personal and psychosocial needs are also expected to be part of surgeons' coping strategies. Proper scheduling of hospital duties will allow surgeons to have quality time for their families and themselves, allowing recovery from the demands of work (George et al., 2020). Knowing the adaptations currently practiced by surgeons that have been shown to be effective should be discussed further so that these coping mechanisms can be disseminated throughout the surgical community and help administrators and managers foster better adaptations within their institutions.

The fourth theme that emerged from this study relates to the management of change and loss in the respondents' personal lives and to the emotional and psychological impacts surgeons are experiencing during COVID-19 pandemic. The current findings are consistent with those of Li et al. (2020), who found that COVID-19 pandemic negatively affected 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 wellbeing (Li et al., 2020). 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 (O'Connor, 2020). In addition, such impacts may create long-

term complications in surgeons' wellbeing that can affect them even after the pandemic subsides. A study by Lu et al. (2020) reported that frontline medical staff suffered more from fear, anxiety and depression than they did before the COVID-19 pandemic (Lu et al., 2020). Focusing on frontline healthcare professionals, a study by Wang et al. (2021) discovered many suffering from acute stress disorder, with a high prevalence of anxiety and depression (Wang et al., 2021). 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 (Chen et al., 2020; Huang et al., 2020; Lai et al., 2020). Furthermore, the current findings also support Wu et al.'s (2020) results that have shown that COVID-19 pandemic has had a significant impact on health workers' worries about infection and their families, as well as on their sleep quality (Wu et al., 2020). With deteriorating mental health, it is likely that the effectiveness of each healthcare worker is compromised, and this may impact on their wellbeing for an extended period of time.

The current study has a number of limitations, including the fact that two open-ended questions may not provide sufficient insight into surgeon mental health, limiting descriptions to one aspect of how COVID-19 pandemic affected them (e.g., how working during the pandemic affected their families). We could also have conducted semi-structured interviews to gain a deeper understanding of pandemic-related problems. However, we felt it 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 the thematic analysis provided a broad range of responses, yielding a rich dataset.

Another limitation relates to the fact that 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. In addition, this study required surgeons to self-report their wellbeing and the challenges they had experienced. As surgeons are reluctant to share emotional distress and seek support (Gerada & Jones, 2014), this might have caused participants to avoid providing in-depth information about their

COVID-19 pandemic struggles. If feasible, future studies ought to include other more objective evaluations of mental health (e.g., clinical interviews) and investigate the reasons why surgeons are less likely to seek support and to discuss issues relating to their own mental health.

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 pandemic 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 pandemic. 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.

In conclusion, this study found that over 80% of surgeons who responded reported being negatively affected by the COVID-19 pandemic, with many respondents highlighting increased challenges in their work environments. Respondents also emphasised a need to manage change in their professional and personal lives, highlighting the substantial emotional and psychological effects of the COVID-19 pandemic on surgeon mental health (e.g., fear and anxiety, loss of motivation, low mood, stress and burnout). There is an urgent need for workplace support and mental health intervention to help surgeons cope with the difficulties they face during the ongoing COVID-19 pandemic.



## **Chapter 7 : Discussion**

### **7.1 Chapter Summary**

Whereas the previous chapters presented in-depth analyses of the individual research topics, this chapter synthesises the results and ties them back to the thesis's initial objectives. In addition, the limitations and general reflections of the thesis are examined, as well as suggestions for further study and interventions are considered. Lastly, the findings' practical implications for healthcare organisations, surgeons, and policymakers are discussed.

### **7.2 Thesis Aim and Summary**

One in every ten patients suffer injury from medical error in high-income countries, according to research by the WHO (2019). When healthcare workers are fatigued and burned out, patients often suffer as a result (WHO, 2016). There are several studies which elucidate the relationship between burnout and patient safety (Garcia et al., 2019; Hall et al., 2016; Panagioti et al., 2018). The systematic research indicates that 32% of surgeons across specialties are experiencing burnout (Balendran et al., 2021). Furthermore, surgeons experience more burnout than most other medical specialties (Shaikh et al., 2022; Wright et al., 2022). As such, this issue among surgeons requires additional attention and it is more important now than ever, as burnout rates are at their highest on record following the COVID-19 pandemic (Alam et al., 2022). During the COVID-19 pandemic surgeons in different countries such as Canada (Alam et al., 2022), United States (James et al., 2022), and Netherlands (Poelmann et al., 2021), claimed that the pandemic had a significant impact on their mental health. So, this problem requires a better understanding and potential solutions.

Overall, the purpose of this thesis was to increase comprehension of the causes, effects, and consequences of surgeon burnout and to identify potential solutions. These were the precise objectives:

- 1) Ascertain the strength of the association between surgeon burnout and the safety of patient care and surgical professionalism.
- 2) Identify the main factors that lead to burnout in surgeons.
- 3) Identify the coping strategies which surgeons use to manage burnout.
- 4) Understand the lived experience of burnout among surgeons.
- 5) Identify the factors underlying the relationship between surgeons' burnout and the quality and safety of patient care.
- 6) Explore the effects of the COVID-19 pandemic on surgeon burnout and mental health.

Five studies were conducted to address these questions (a systematic review, three qualitative studies, a two-wave survey study, and a mixed-methods evaluation), and each was discussed in separate chapters.

**Chapter 2** gave a comprehensive review and meta-analysis synthesising the relationships between surgeon burnout and patient safety and professionalism. The study included empirical research that measured surgeons' burnout, patient safety, and professionalism in patient care and reported the results from narrative and meta-analytic synthesis.

The findings of the systematic review provided important insights into the existing evidence base on surgeon burnout and identified knowledge gaps, one of which is that there are not enough qualitative studies to provide a deep understanding of what causes burnout and how surgeons deal with it. So, in **Chapter 3**, thematic analysis was utilised to analyse data from semi-structured interviews with 14 surgeons. The investigation focused on elucidating the key causes of burnout and burnout management strategies among surgeons.

The results of a systematic review also identified a need for more studies to give a deep understanding of how surgeons experience burnout to elucidate the link between burnout and patient safety. **Chapter 4** addressed this gap by provided a secondary analysis of the interview data acquired for Chapter 3, but focused on two separate questions: how does burnout affect surgeons personally and how does it affect care? Thematic analysis was also used to examine this data.

The systematic review revealed that there has been no quantitative study identifying a link between surgeons' burnout and patient safety in the NHS, which is the UK healthcare system. Therefore, **Chapter 5** examined surgeon burnout, stress, and patient safety perceptions using a two-wave quantitative survey conducted during the first six months of the COVID-19 pandemic. Two cross-sectional groups and a longitudinal group (for participants who responded at both time points) were formed from the dataset.

To further enrich and complement the data presented in Chapter 5, **Chapter 6** conducted a qualitative investigation into the impact of the COVID-19 pandemic on surgeons. This chapter analysed free-text responses to open-ended questions in Chapter 5's survey (May to June 2020) using thematic analysis. The study analysed replies to two open questions: What obstacles have the COVID-19 pandemic caused you at work and home? How does stress affect you? Qualitative data were thematically analysed, and for content.

**Objective 1: Ascertain the Strength of the Association between Surgeon Burnout with the Safety of Patient Care and Surgical Professionalism.**

To determine the connection between surgeon burnout and patient safety, first, a systematic review was conducted (Study 1/Chapter 2). There was a total of 27,248 participants across 14 studies which were included in the narrative review, and nine studies were included in the meta-analysis. The odds of being involved in a medical error increased 2.5-fold for those who were experiencing burnout. Meta-analysis was not feasible on the professionalism outcome variables due to the small number of studies and the high heterogeneity between them. However, the narrative synthesis revealed a connection between high burnout, short tempers, malpractice lawsuits, and a lack of empathy. There was no correlation between burnout and how satisfied patients felt.

I also determined the relationship between surgeons' burnout and patient safety using a two-wave quantitative survey study (Study 6/Chapter 5). Three groups were created from this dataset: two cross-sectional groups "for those responding in wave 1 or wave 2 only", and one longitudinal group "for those who responded at both time points". The first cross-sectional group

included 108 surgeons, and the results showed that there was a strong link between burnout and patient safety perceptions, which means that, when burnout was high, surgeons' views on safety were poorer. A significant positive link was also found between burnout and the likelihood of reporting a near miss. The second cross-sectional group included 84 surgeons. The results showed that there was a significant inverse link between burnout and perceptions of safe practice. There was also a strong link between being burnt-out and having a near miss happen more often. The longitudinal group included 39 surgeons and found a bi-directional connection between burnout and patient safety perceptions.

**Objective 2: Identify the Main Factors that Lead to Burnout in Surgeons.**

Semi-structured interviews with 14 general and subspecialty surgeons were conducted as part of a qualitative study to better understand the causes of burnout in this group (Study 2/Chapter 3). Several themes, including "rising to the challenge of surgical work", "interpersonal conflict at work", "greater demands than resources", "the challenge of work-life balance", and "the devastating impact of errors and poor patient outcomes" emerged from this thematic analysis as potential contributors to surgeon burnout.

**Objective 3: Identify the Coping Strategies which Surgeons Use to Manage Burnout.**

In addition, we used qualitative interviews with 14 surgeons to learn about their experiences with burnout on the job (Study 2/Chapter 3). Surgeons were found to use a variety of coping mechanisms, such as cognitive restructuring, seeking social support, stepping aside or down from the profession, and prioritising personal health, to deal with burnout. The research also revealed that some surgeons employed maladaptive coping mechanisms.

**Objective 4: Understand the Lived Experience of Burnout Among Surgeons.**

To answer the question, of how burnout affects surgeons personally, and what is their burnout experience like, a secondary thematic analysis of the semi-structured interviews with 14 surgeons was conducted (Study 3/Chapter

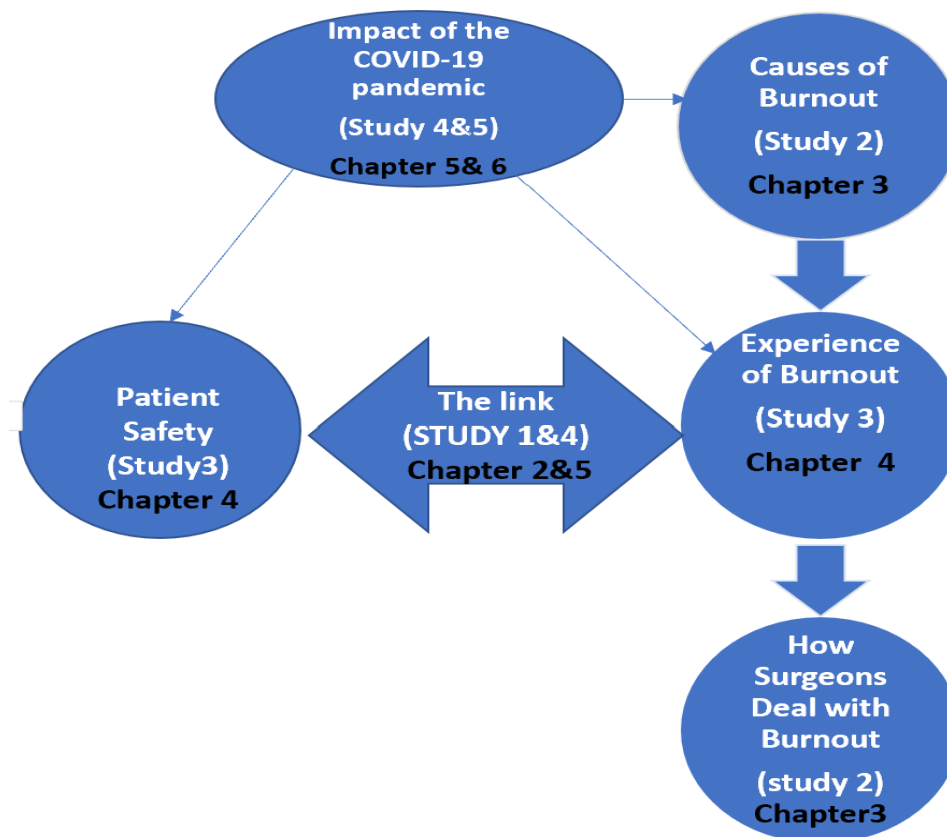
4). The study identified three themes in surgeons' burnout experiences: first, burnout is common but often goes unnoticed or unacknowledged; second, burnout is a personal crisis; and third, burnout creates vulnerability at work.

**Objective 5: Identify the Factors Underlying the Relationship between Surgeons' Burnout and the Quality and Safety of Patient Care.**

To answer the question "How does burnout affect the care provided by surgeons in the United Kingdom (UK)?" Study 3/Chapter 4 conducted a secondary thematic analysis of the semi-structured interview data with 14 surgeons. The study also identified four themes concerning burnout's impact on patient care: first, burnout reduces the quality of surgeon-patient relationships; second, burnout has an impact on patient safety; third, burnout has an impact on staff relationships; and fourth, burnout makes surgeons less motivated to improve.

**Objective 6: Explore the Effects of the COVID-19 Pandemic on Surgeon Burnout and Mental Health.**

Chapter 6 analysed qualitative survey data using content analysis to explore the professional and personal effects of the COVID-19 pandemic on UK National Health Service (NHS) surgeons. A total of 141 surgeons responded to the survey, and the results showed that 85.8% were generally negatively affected by the COVID-19 pandemic, with 7.8% being severely affected. Four key themes were identified from qualitative thematic analysis of responses to the pandemic's impact: 1) a changing and challenging work environment as a result of the COVID-19 pandemic, 2) challenges to professional life and development, 3) dealing with change and loss in respondents' personal lives; and 4) emotional and psychological consequences. Also, a longitudinal study was run, which included 39 surgeons, and found burnout increased significantly between June, 2020, and January 2021 (Study 4/ Chapter 5).



**Figure 7-1: An overview of the relationship between the thesis studies/chapters.**

### 7.3 Comparison with Previous Studies

The current findings confirm existing knowledge and extend it in six main ways. Firstly, these findings extend existing knowledge by showing that there is a consistent link between higher burnout and poorer patient safety in surgeons. Previous research has established this association in groups of physicians and multidisciplinary healthcare professionals, but there have been only a small number of surgeon-specific studies, and none of these were qualitative. The present thesis has established the presence of this association, estimated that burnout is linked with a 2.5-fold higher risk in surgeons (Study 1/Chapter 2), used qualitative methods to elucidate the nature of this relationship (Study 2&3/Chapters 3& 4), and conducted a two-wave quantitative survey study (Study 4/Chapter5). Together, these studies demonstrate that there is a reliable link between burnout and poorer patient safety and that this association may be bidirectional. That is, this thesis indicated that surgeon burnout may increase the probability of medical errors,

and that involvement in medical errors may increase the risk of burnout. This is in line with the findings of earlier studies that showed links between burnout, subpar professional behaviour, and patient safety among healthcare professionals (Abraham et al., 2020; Dewa et al., 2017; Hall et al., 2016; Tawfik et al., 2019) discovered evidence suggesting that the relationship between patient safety and burnout among physicians was cyclical, with patient safety issues leading to burnout and burnout leading to patient safety issues, respectively. However, the strength of this thesis is that it focused specifically on surgeons, who are considered to be particularly susceptible to burnout (Balendran et al., 2021). Regarding patient satisfaction, the systematic review (Chapter 2) identified only one study that found no link between burnout and patient satisfaction among surgeons, the opposite result of the other studies, which found physician burnout to affect patient satisfaction (Anagnostopoulos et al., 2012). To clarify this point, more research is needed to explore the relationship between patient satisfaction and burnout among surgeons.

Second, the current study extends earlier research by demonstrating that burnout can significantly impact interactions with colleagues and teamwork (Study 3, Chapter 4). The current findings, which similar to existing work on health care staff linking burnout and teamwork communication. The study by Rehder et al. (2020). cover 7,923 health care staff , found a link between poor teamwork and burnout. Our findings are consistent with those reported in previous studies of surgeons (Businger et al., 2010). For example, Businger et al. (2010) recruited 405 surgeons in Switzerland and found that poor communication with nurses and disruptions from phone consultations were two of the strongest predictors of moderate to high burnout. The present findings extend these findings by suggesting that the relationship can also exist in the other direction, with burnout leading to poorer interactions. The existence of this relationship between burnout and interactions is also consistent with research in the wider medical setting. For example, a study by Galletta et al., (2016) examined how burnout was linked to psychosocial factors and hospital-acquired illnesses. They recruited 130 critical care providers and found work-related emotional weariness, an aspect of burnout,

was connected to cynicism, which is a factor which negatively affects team interactions.

Third these findings extend our understanding of the causes of burnout in surgeons. The qualitative study reported in Chapter 3 (Study 2) found that many elements contributed to burnout: the personality and attitude involved in psychologically rising to the challenge of surgical work; interpersonal conflict at work; experiencing greater demands than resources; the challenge of work-life balance; and the devastating impact of errors and poor patient outcomes. These findings suggest that burnout is often caused by factors that are interpersonal in nature. This is in line with research from the wider medical context which has indicated there are several elements which contribute to physician burnout, among them excessive workloads, long working hours, specialty selection, frequent duty responsibilities, detailed documentation, time spent at home on work-related aspects, the danger of malpractice suits, and dealing with patient death and illness (West, Dyrbye, & Shanafelt, 2018). An earlier study by Shanafelt et al. (2015) found burnout was caused by organisational variables such as bad leadership behaviours, work load expectations, insufficient rewards, restricted interpersonal teamwork, and limited prospects for growth and social support for physicians. Therefore, the present findings are consistent with research in other medical groups and extend this by highlighting the importance of addressing structural factors that contribute to stress and burnout among healthcare professionals.

The current study is also supported by several studies linking surgeons' personality attributes to burnout (Cofer et al., 2018; Galaiya et al., 2020). In the case of surgeons, the emotional burden of errors and poor patient outcomes can lead to feelings of guilt, frustration, and distress, which may exacerbate burnout over time. Therefore, our findings highlight the importance of addressing structural factors that contribute to stress and burnout among healthcare professionals to ultimately improve both employee wellbeing and patient outcomes. It also confirms a relationship between unfavourable interpersonal interactions and surgeon burnout, which has been reported in previous studies (Businger et al., 2010). The Businger et al. (2010) study covered 405 surgeons in Switzerland and found that poor communication with nurses, disruptions from phone consultations, and an increased workload



overall were the strongest predictors of moderate to high burnout. In addition to confirming these previous findings, the current thesis used qualitative methods which complement and enrich the understanding generated by previous studies, which were quantitative in nature.

Third this thesis helps to illustrate the link between the findings and the theories regarding burnout. For example, the current research found that the challenge of work-life balance and greater demands than resources can contribute to burnout, supporting the demands and resources theory. This theory explains that burnout can result from an imbalance between job demands and available resources (Bakker & Demerouti, 2007). Therefore, our result provides evidence for the demands and resources theory and its explanation of the relationship between job demands and burnout. In addition, our findings revealed that surgeons who encounter errors and poor patient outcomes are at a heightened risk of burnout due to the overwhelming impact of these experiences on their overall wellbeing. This observation aligns with structural theory, which proposes that burnout can arise when individuals are unable to effectively cope with stressors at work (Edú-Valsania et al., 2022). However, the thesis did not provide clear evidence to support the organizational theory of burnout, also the thesis did not focus specifically on testing theories related to burnout. Therefore, the lack of support for the theory does not necessarily mean it is invalid, but rather indicates a need for further research into different theories related to burnout.

The emotional burden of errors and poor patient outcomes can exacerbate burnout among surgeons, emphasizing the need to address structural factors that contribute to stress and burnout among healthcare professionals. By improving employee well-being, healthcare organizations can also improve patient outcomes.

Fifth, these findings extend the literature on how surgeons deal with burnout and the extent to which burnout affects surgeons. The qualitative study reported in Chapter 3 (Study 2), addressed how surgeons cope with burnout and found that surgeons use a variety of strategies, including both healthy strategies such as prioritising personal health and unhealthy strategies such as substance abuse. Previous research on healthcare

professionals has found similar results, 15% of participants who scored high for emotional exhaustion tested positive for alcohol abuse (Rath et al., 2015). Therefore, this study adds to the literature on how surgeons specifically deal with burnout.

Six, this thesis extends existing knowledge by providing potential reasons for the observed low rates of help-seeking among surgeons by describing the experience of burnout among surgeons (Study 3/Chapter 4). It has previously been observed that surgeons are less likely to seek help for mental health problems than other groups of physicians and healthcare professionals (Gerada & Jones, 2014), which may help explain their high rates of suicide (Harvey, 2019). However, the reasons why healthcare professionals “stay silent” or “speak up” about any concerns are complex (Montgomery et al., 2023), and it is unclear why surgeons are more prone to stay silent about mental health struggles. The results of Clough et al. (2019) were particularly interesting given observations behind why physicians rarely seek help when they are suffering from stress and burnout (Clough et al., 2019). The study asked 274 physicians about the reason behind not seeking help for their mental health. The participants mentioned that things like stigma and fear of professional consequences, as well as access to services and professional culture, were problems (Clough et al., 2019). Findings from this thesis indicate that surgeons may struggle to recognise burnout when they are experiencing it. Bravado may also be a factor, as the present findings indicate that for some surgeons, feigning confidence can be a coping strategy to manage feelings of insecurity. Disregarding such negative feelings may function as a mechanism to protect their ego (Freud, 2018).

Seventh, the present thesis contributes to previous literature by improving understanding of the effects of the COVID-19 pandemic on NHS surgeons. The conclusion from Chapter 5 (Study 4) was that burnout increased over the course of six months from June 2020 to January 2021 during the pandemic and that the relationship between burnout and patient safety during this time appeared to be bidirectional. Both findings are consistent with previous research. Regarding increased burnout at this time, large national surveys have reported increased burnout since the onset of the pandemic. In the UK, in the GMC survey among trainee doctors, 56% of

trainee doctors reported high or very high burnout, up from 43% in early 2020 (GMC, 2021).

Lastly, the qualitative examination of surgeons' responses highlighted changing and stressful work situations caused by the COVID-19 pandemic (Study 5/Chapter 6), including surgeons' worries about delayed and cancelled surgeries. Søreide et al. (2020) observed that the COVID-19 pandemic impaired long-term surgical service delivery and led to cancellations and delays. Moreover, 27% of respondents to Chadi et al. (2020) noted surgical service interruptions. During the pandemic, surgeons also reported PPE shortages, which made them afraid and apprehensive about their own and their patient's safety. This outcome is similar to Jessop et al. (2020) finding that the lack of PPE, combined with changing and confusing work structures, led to uncertainty and anxiety for healthcare professionals. The COVID-19 study in this thesis (Study 5/Chapter 6) explored the personal and professional obstacles surgeons faced during the COVID-19 pandemic. These obstacles are consistent with studies of Italian and Indian surgeons (Mishra et al., 2020; Pertile et al., 2020). The observations of the qualitative study regarding the effect of COVID-19 on surgeons' mental health are also congruent with those of Li et al. (2020), who indicated that the pandemic negatively affects mental health because of special measures that may impede effective communication, personal contact, and overall interaction. The present studies extend the existing literature by providing information on these issues in UK surgeons specifically.

#### **7.4 Thesis Strengths and Limitations**

The thesis had three key strengths. First, this research provided a comprehensive exploration into surgeons' burnout, how they feel, think and deal with burnout, and how it affects patient safety. Second, this thesis used several approaches to identify the relationship between surgeon burnout and patient safety (systematic review and meta-analysis, quantitative and qualitative). Third, this thesis examined burnout among UK surgeons, but it appears a global phenomenon, although its definition varies by country. In some countries, burnout constitutes a medical diagnosis, whereas in others it

is a socially acceptable descriptor with little psychiatric association (Schaufeli, Leiter, & Maslach, 2009).

There are several limitations of the research that ought to be acknowledged. First, none of the studies included an objective measure of medical errors, and all relied on self-report. As the current thesis focused on measuring safety perceptions, not behaviour, this is one of the limitations of this study. Surgeons had to self-report their wellbeing and difficulties; however, surgeons are reluctant to seek help and express their emotional discomfort (Gerada & Jones, 2014). Therefore, it is possible that the surgeons may have under-reported their levels of distress, burnout and information regarding patient safety.

Second, This thesis has contributed to our understanding of burnout, but its relevance to patient safety and quality of treatment is less evident because this study discusses patient safety in terms of connection with surgeons burnout. In addition, the key measure of patient safety perceptions used in the thesis, the Safe Practitioner Scale, has only a single item. As such, no reliability estimates can be calculated on it. However, it is worth noting that the scale has been shown to have good levels of convergent and divergent validity through a focus group of nurses, which found this item appropriate for assessing perceived safety (Louch et al., 2016).

Third, studies in this thesis included a diverse range of surgical specialities, and some specialities may experience greater levels of burnout than others. According to Medscape (2021), the level of burnout was different in different specialties. The highest percentage of burnout was in urologists, general and orthopaedic surgeons. So, the limitation of this thesis is that some surgeons in a specific specialty may be suffering more from burnout, which this thesis did not discuss. As a result, future research should attempt to replicate the current findings using a larger, more representative sample.

Fourth, gender differences have been observed in burnout. For example, some studies suggest women suffer more and it can cause them to leave their jobs as surgeons (Kinslow et al., 2020; Liang et al., 2019; Lindeman et al., 2017; Salles et al., 2019). On the other hand, some studies found men suffer

more (Elmore et al., 2016; Lebares et al., 2019; Malik et al., 2016). Therefore, the current research cannot rule out gender differences in surgeons in the context of burnout as it did not have enough women participants to analyse the groups and compare between groups, and therefore the studies cannot contribute to this discussion. As a result, future research is needed to investigate the difference in burnout based on gender.

## **7.5 Thesis Reflections**

This thesis required the researcher to attend surgeons' meetings, enter the world of surgeons, understand surgeons' situations, and build a connection with the participating surgeons, which took work. It can be difficult to collect information from surgeons because they have a great deal of responsibility and busy work lives. Therefore, finding time to conduct interviews, surveys, follow-up surveys, or workshops was challenging. Different strategies were used to collect the required samples, from snowball sampling to advertising studies through social media to travelling around England to interview surgeons. While the sample sizes were small, they were adequate for achieving the objectives of this research.

In addition, the work for this thesis was directly affected by the COVID-19 pandemic in several ways. First, Reboot-C was delayed several times until the pandemic settled. The method of interaction also changed, from in-person to online workshops. Furthermore, the recruitment of surgeons was affected because of the increased burden on the healthcare sector due to the pandemic. Consequently, overcoming these difficulties and adding to the research on surgeons' burnout during the COVID-19 pandemic represents a significant achievement.

This thesis considered a sensitive issue: surgeons' medical errors. Therefore, surgeons had to overcome the embarrassment and emotional pain when answering questions regarding fatigue and medical mistakes. Recognising that surgeons might not be comfortable talking openly about these situations and that they could hesitate to give honest answers if they thought it might hurt them to do so, many strategies were employed. The

participants were informed that they did not have to answer any uncomfortable questions and that they could withdraw from the study at any time. Additionally, the interviews started with more general questions about burnout and patient safety before focussing on the participant's experience.

This thesis measured medical errors based on surgeons' perceptions. Patient safety can also be measured through official incident reports or chart audits, but there are barriers to reporting medical errors, such as the perceived ramifications of reporting mistakes (Aljabari & Kadhim, 2021). Doing this was not always practical or feasible, especially as part of a PhD thesis.

## **7.6 Implications**

Burnout among surgeons is detrimental to patient safety. Burnout is not just an individual problem that needs to be treated but can be a symptom of larger systemic issues within organisations. Healthcare organisations, medical schools, and the government should work together to improve wellbeing and reduce burnout among surgeons by providing primary, secondary, and tertiary prevention as well as maintenance and monitoring.

The concept of primary prevention in addressing burnout involves taking measures to prevent it from happening in the first place. One way healthcare organisations can achieve this is by creating a more conducive work environment for surgeons. For example, they can consider reducing working hours or making the workload more manageable. Additionally, primary prevention should also focus on improving medical education by equipping surgeons with skills and strategies to better handle stress in the workplace. It should also target individual behaviours and relationships between employees, with a particular emphasis on improving interpersonal relationships within surgical teams to promote healthier work relationships. By implementing these measures, healthcare organisations can take a proactive approach to addressing burnout and promoting overall wellbeing among their surgeons.

Improving professional identity also can help reduce burnout in a number of ways. (Sun et al., 2022.) When surgeons have a strong sense of professional identity, they are more likely to feel a sense of purpose and

meaning in their work, which can help them cope with the demands and stresses of the job. They may also feel a greater sense of responsibility to their patients and a commitment to providing high-quality care, which can serve as a source of motivation and fulfilment.

Secondary prevention focuses on identifying and addressing surgeon burnout at an early stage to minimise its negative impact. Our findings indicated that interventions should avoid stigma, as surgeons were reluctant to talk about burnout. We suggest that resilience-building training could be less stigmatising than interventions presented as 'burnout prevention', leading to higher acceptance among surgeons. Furthermore, this study demonstrated that surgeons may not recognise the earlier stages of burnout. Therefore, interventions should focus on raising awareness to help surgeons identify signs of work-related stress. Interventions should increase awareness and promote help-seeking behaviour by representing it as a strength rather than a weakness. For instance, discussing mental health at work may help raise awareness. It's important for surgeons to balance their desire to help their patients with a realistic assessment of what is medically necessary and sustainable for themselves and the healthcare system. This can involve developing effective communication with patients to explain the risks and benefits of different treatment options, as well as seeking support and resources to manage workload and avoid burnout.

Tertiary prevention focuses on managing existing burnout. In the current research surgeons reported two methods of coping with burnout: seeking help and quitting their job. These findings could guide the development of interventions. For instance, healthcare organisations could incorporate mentoring schemes and informal social assistance into daily operations. To improve the working environment for surgeons, interventions should target individuals in regard to interpersonal and intraorganizational differences.

Finally, maintenance and monitoring comprise ongoing assistance, monitoring, and follow-up techniques to maintain surgeons' wellbeing. Reducing burnout among surgeons necessitates a multifaceted approach that includes various elements of maintenance and monitoring, such as workload and time-management, emotional support, including peer support and

counselling services, and regular performance monitoring to identify areas that require additional support or training. This comprehensive approach could help reduce burnout and improve quality of life among surgeons, thereby improving patient care. As burnout's social focus, robust research foundation, and specific linkages to the work domain develop a distinct and valuable contribution to people's health and well-being (Maslach, Schaufeli, & Leiter, 2001). Leiter, Maslach, and Frame (2014) found that successful workplace interventions should take into account the individual. They also discovered that research on job engagement, which is the opposite of burnout, has led to effective treatments for burnout. In summary, considering the individual and focusing on job engagement can be helpful in treating burnout in the workplace.

## **7.7 Future Research**

Findings from the thesis suggest that minimising surgeon burnout has the potential to improve both patient care and surgical professionalism. As burnout and medical errors appear to be cyclical, improving surgeons' care may help prevent burnout. Developing effective, evidence-based strategies to improve burnout will likely have benefits for patient safety and vice-versa, but no study has yet to test this. Future studies should test whether burnout reduction interventions have concomitant benefits for improving patient safety. Conversely, future research should also establish whether patient safety interventions reap benefits for surgeon burnout.

Additional research is needed to determine if there are cultural variations or major inequities in how burnout affects surgeons and surgical practice across a larger range of nations and specialties. Future research should target a large number of participants, as the current study only included a relatively small number of surgeons.

## **7.8 Conclusion**

Burnout is more common in surgeons than in most other healthcare professionals and physician groups. This thesis contributes to the literature on burnout among surgeons in three main ways. First, it demonstrates that there



is a consistent link between burnout and poorer patient safety in surgeons, in the same manner that has been found in other professional groups. This suggests that intervening in burnout is an important organisational consideration and not a personal problem for surgeons to manage alone.

Second, it shows that the COVID-19 pandemic has further increased levels of burnout in surgeons and indicates that this is due to a range of pandemic-related stressors, such as challenges to professional life and development.

Third, it makes recommendations for interventions. For example, interventions should consider aspects fundamental to surgical practice as well as interpersonal or organisational factors amenable to intervention. Preventive intervention programmes are needed to assist surgeons in recognising burnout and enhancing their well-being to improve patient safety.

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## Appendix A

### Chapter 2/ Study 1 (Systematic Review appendix)

#### A.1 Search strategy for five databases.

##### 1-Medline 1996-current

	Searches	Results
1	Burnout, Psychological/	96
2	Emotional exhaustion.tw.	1627
3	burn out*.tw.	548
4	burnouts.tw.	32
5	Depersonalization/	687
6	personal accomplishment.tw.	736
7	disengage*.tw.	3426
8	"Internship and Residency"/	32489
9	Physicians/ or physician*.tw.	257864
10	doctor*.tw.	76606
11	Orthopedic Surgeons/ or "Oral and Maxillofacial Surgeons"/ or Surgeons/	3849
12	surgeon.tw.	58327
13	Internship.tw.	1509
14	Residency.tw.	16054
15	Specialties, Surgical/	2806
16	Surgery, Oral/ or Surgery, Plastic/	9436

17	surger*.tw.	686819
18	surgical*.tw.	584130
19	resident.tw.	43519
20	registrar.tw.	1053
21	Urology/	6407
22	Neurosurgery/	6204
23	gynecologist.tw.	1707
24	patient harm/	126
25	patient safety/	16535
26	safety management/	19049
27	medical errors/	15746
28	near miss, healthcare/	119
29	Treatment Outcome/	867260
30	Incidence/	204497
31	Medication Errors/	10127
32	(Near adj miss).tw.	1003
33	(Never adj event*).tw.	259
34	(Patient adj accident*).tw.	29
35	(wrong adj site surgery).tw.	183
36	Professionalism.tw.	5942
37	Professional performance.tw.	346
38	Professional behavior.tw.	622
39	Professional attitude.tw.	125
40	Professional Competence.tw.	699

41	Efficiency.tw.	249301
42	clinical effectiveness.tw.	7225
43	Diagnostic Errors/	20697
44	treatment outcome*.tw.	333403
45	patient outcome*.tw.	34060
46	clinical outcome*.tw.	117016
47	Mortality/	23164
48	quality of health care.tw.	4234
49	Patient Care/	7272
50	Professional Practice/	8836
51	Patient Compliance/	41636
52	Physician-Patient Relations/ or Patient-Centered Care/	60772
53	Physician-Patient Relations/	45439
54	Safety/	30211
55	Patient Satisfaction/	71842
56	adverse event*.tw.	113534
57	unintended event*.tw.	32
58	unintended consequence*.mp. or "Delivery of Health Care"/	59529
59	complaint*.tw.	51668
60	Medication Errors/ or Inappropriate Prescribing/	12564
61	Malpractice.tw.	4494
62	risk factor*.tw.	412189
63	Empathy/	14162
64	losing temper.tw.	3

65	1 -7 OR	2823
66	8-23 OR	1411548
67	24-64 OR	2160340
62	65 and 66 and 67	211
63	limit 62 to English language	600

**2-EMBASE**

	<b>Searches</b>	<b>Results</b>
1	Burnout/	15214
2	Emotional exhaustion.tw.	2803
3	burn out*.tw.	1466
4	burnouts.tw.	51
5	depersonalization/	4312
6	personal accomplishment/	19
7	disengage*.tw.	5251
8	"Internship and Residency"/	202002
9	Physicians/ or physician*.tw.	599013
10	doctor*.tw.	174391
11	Orthopedic Surgeons/ or "Oral and Maxillofacial Surgeons"/ or Surgeons/	111945
12	surgeon.tw.	127765
13	Internship.tw.	3454
14	Residency.tw.	31669
15	Specialties, Surgical/	610244
16	Surgery, Oral/ or Surgery, Plastic/	85364

17	surg*.tw.	2544086
18	resident/	34298
19	medical registrar/ or general practise registrar/ or specialist registrar/	68
20	urology/	34978
21	neurosurgery/	60552
22	gynecologist/	6812
23	medical error/ or patient harm/ or safety/ or patient care/	543339
24	patient safety/	102616
25	safety management.mp. or safety/	259736
26	medical errors/	17949
27	near miss.tw.	2217
28	Treatment Outcome/	807242
29	Incidence/	350796
30	Medication Errors/	16307
31	medication error/	17459
32	(Near adj miss).tw.	2091
33	(Never adj event*).tw.	528
34	(Patient adj accident*).tw.	116
35	(wrong adj site surgery).tw.	249
36	Professionalism.tw.	8021
37	Professional performance.tw.	643
38	Professional behavior.tw.	963
39	Professional attitude.tw.	255

40	Professional Competence.tw.	1250
41	Efficiency.tw.	457540
42	clinical effectiveness.tw.	14164
43	Diagnostic Errors/	52296
44	treatment outcome*.tw.	64626
45	patient outcome*.tw.	67984
46	clinical outcome*.tw.	236470
47	Mortality/	760848
48	quality of health care.tw.	7540
49	Patient Care/	276115
50	Professional Practice/	56365
51	Patient Compliance/	125421
52	Physician-Patient Relations/ or Patient-Centered Care/	251957
53	Physician-Patient Relations/	111694
54	patient safety/ or safety/	357751
55	Patient Satisfaction/	127332
56	adverse event*.tw.	254496
57	unintended event*.tw.	47
58	health care quality/ or unintended consequence*.tw.	23498
59	complaint*.tw.	133275
60	Medication Errors/	17459
61	Malpractice.tw.	10762
62	risk factor*.tw.	776918
63	Empathy/	24062

64	losing temper.tw.	4
65	1 or 2 or 3 or 4 or 5 or 6 or 7	19327
66	8-22 or	3592043
67	23-64or	4439561
68	65 and 66 and 67	1937
69	limit 68 to English language	1814

### 3- PsycINFO

	<b>Searches</b>	<b>Results</b>
1	Burnout.tw.	12667
2	Burnout/	20220
3	Emotional exhaustion.tw.	3276
4	burn out*.tw.	524
5	burnouts.tw.	131
6	depersonalization/	885
7	personal accomplishment.tw.	1532
8	disengage*.tw.	5730
9	Physicians/ or physician*.tw.	66193
10	doctor*.tw.	38030
11	Orthopedic Surgeons/ or "Oral and Maxillofacial Surgeons"/ or Surgeons/	695
12	surgeon.tw.	1887
13	Internship.tw.	3217
14	Residency.tw.	6004
15	surg*.tw.	46786



16	resident.tw.	12933
17	registrar.tw.	377
18	Urology.tw.	329
19	Ophthalmologists.tw.	230
20	exp NEUROSURGERY/	5532
21	exp GYNECOLOGISTS/	269
22	medical error/ or patient harm/ or safety/ or patient care/	14079
23	patient safety/	1219
24	safety management.mp. or safety/	12876
25	medical errors/	1219
26	Treatment Outcome/	31927
27	(Near adj miss) .tw.	301
28	(Never adj event*) .tw.	7
29	(Patient adj accident*) .tw.	7
30	(wrong adj site surgery).tw.	6
31	Professionalism.tw.	4572
32	Professional performance.tw.	340
33	Professional behavior.tw.	591
34	Professional attitude.tw.	129
35	Professional Competence.tw.	1491
36	Efficiency.tw.	39721
37	clinical effectiveness.tw.	1424
38	treatment outcome*.tw.	23460

39	patient outcome*.tw.	4988
40	clinical outcome*.tw.	19181
41	Mortality/	29172
42	quality of health care.tw.	1655
43	Patient safety or safety/	13267
44	Patient Satisfaction/	5209
45	adverse event*.tw.	11228
46	unintended event*.tw.	7
47	health care quality/ or unintended consequence*.tw.	1876
48	complaint*.tw.	21792
49	Malpractice.tw.	1586
50	risk factor*.tw.	98584
51	Empathy/	12478
52	losing temper.tw.	3
53	exp Errors/ or exp Patient Safety/	14515
54	1-8 or	22260
55	9-21 or	160402
56	22-53or	298249
57	54and 55 and 56	339
59	limit 56 to English language	300

#### 4- CINAHL search

N	
1	TX burnout

2	(MM "Burnout, Professional/AE/SU/PF")
3	"Emotional exhaustion"
4	(MM "Depersonalization/PF")
5	"disengage**"
6	"personal accomplishment"
7	"Internship and Residency"
8	(MM "Physicians") OR (MM "Physicians, Family") OR (MM "Physicians, Emergency")
9	"physician**"
10	"doctor**"
11	(MM "Ambulatory Surgery") OR (MM "American Association of Oral and Maxillofacial Surgeons")
12	(MH "Orthopedic Surgery")
13	""Oral and Maxillofacial Surgeons""
14	(MH "Internship and Residency")
15	"Residency"
16	(MH "Specialties, Surgical")
17	(MM "Surgery, Oral") OR "Surgery, Oral" OR (MM "Surgery, Otorhinolaryngologic") OR (MM "Surgery, Plastic") OR (MM "Surgery, Prophylactic") OR (MM "Surgery, Reconstructive") OR (MM "Surgery, Podiatric")
18	"resident"
19	"registrar"
20	(MM "Urology")
21	"Neurosurgery"

22	"gynaecologist"
23	"patient harm"
24	"safety management"
25	(MM "Treatment Errors") OR (MM "Medication Errors") OR (MM "Diagnostic Errors") OR (MM "Treatment Delay") OR (MM "Health Care Errors") OR (MM "Adverse Health Care Event") OR (MM "Patient Safety") OR (MM "Safety") OR (MM "Public Health") OR (MM "Wrong Site Surgery")
26	"near miss, healthcare"
27	(MH "Treatment Outcomes")
28	"Incidence"
29	"accident"
30	(MM "Medication Errors") OR "Medication Errors" OR (MM "Medication Risk (Saba CCC)")
31	"Near miss"
32	"Never event"
33	"Patient accident"
34	(MM "Professionalism") OR "Professionalism"
35	(MM "Professional Practice")
36	"Professional behavior"
37	"Professional attitude"
38	"Professional Competence"
39	"Efficiency"
40	"clinical effectiveness"
41	(MM "Treatment Outcomes")

42	"patient outcome**"
43	"clinical outcome**"
44	"Mortality"
45	(MM "Quality of Health Care")
46	"Patient Care"
47	(MM "Professional Practice")
48	(MM "Patient Compliance")
49	(MM "Physician-Patient Relations")
50	"Patient-Centered Care"
51	(MM "Physician-Patient Relations")
52	"Safety"
53	"Patient Satisfaction"
54	"unintended event**"
55	"unintended consequence**"
56	""Delivery of Health Care""
57	"complaint**"
58	(MM "Medication Errors")
59	(MM "Inappropriate Prescribing")
60	(MM "Malpractice")
61	(MM "Risk Factors")
62	(MM "Empathy")
63	"losing temper"
64	((S1 OR S2 OR S3 OR S4 OR S5) AND (S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21) AND (S22 OR S23 OR S24

	OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65) = 497
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## 5- Web of science:

1	(TS="Burnout") AND LANGUAGE: (English)	21015
2	(TS="Emotional exhaustion") AND LANGUAGE: (English)	3363
3	(TS= "Depersonalization") AND LANGUAGE: (English)	2457
5	(TS="personal accomplishment") AND LANGUAGE: (English)	1152
6	(TS="disengage*")	9,288
7	(TS="Internship and Residency") AND LANGUAGE: (English)	567
8	(TS="physician*") AND LANGUAGE: (English)	282022
9	(TS="doctor*") AND LANGUAGE: (English)	109532
10	(TS="Surg*") AND LANGUAGE: (English)	1526112
11	(TS="Internship and Residency") AND LANGUAGE: (English)	567
12	(TS="Residency") AND LANGUAGE: (English)	24988
13	(TS="Specialties, Surgical") AND LANGUAGE: (English)	30
14	(TS="Surgery, Oral") AND LANGUAGE: (English)	227

15	(TS="resident") AND LANGUAGE: (English)	74144
16	(TS="registrar") AND LANGUAGE: (English)	1719
17	(TS="Urology") AND LANGUAGE: (English)	20896
18	(TS="Neurosurgery") AND LANGUAGE: (English)	19642
19	(TS="gynaecologist") AND LANGUAGE: (English)	621
20	(TS="patient harm") AND LANGUAGE: (English)	1065
21	(TS="safety management") AND LANGUAGE: (English)	6262
22	(TS="Treatment Errors") AND LANGUAGE: (English)	201
23	(TS="Medication Errors") AND LANGUAGE: (English)	5026
24	(TS="Diagnostic Errors") AND LANGUAGE: (English)	1652
25	(TS="Health Care Error*") AND LANGUAGE: (English)	36
26	(TS="Adverse Health Care Event") AND LANGUAGE: (English)	2
27	(TS= "Patient Safety") AND LANGUAGE: (English)	25716
28	(TS="Wrong Site Surgery") AND LANGUAGE: (English)	228
29	(TS="near miss, healthcare") AND LANGUAGE: (English)	5
30	(TS="Incidence") AND LANGUAGE: (English)	626084
31	(TS="accident") AND LANGUAGE: (English)	12
32	(TS="Medication Errors") AND LANGUAGE: (English)	5026
33	(TS="Near miss") AND LANGUAGE: (English)	1797
34	(TS="Never event*") AND LANGUAGE: (English)	301
35	(TS="Patient accident*") AND LANGUAGE: (English)	36
36	(TS="Professionalism") AND LANGUAGE: (English)	12561

37	(TS="Professional Practice") AND LANGUAGE: (English)	6843
38	(TS="Professional behaviour") AND LANGUAGE: (English)	366
39	(TS="Professional Discipline") AND LANGUAGE: (English)	221
40	(TS="Professional attitude") AND LANGUAGE: (English)	197
41	(TS="Professional Competence") AND LANGUAGE: (English)	2248
42	(TS="clinical effectiveness") AND LANGUAGE: (English)	8527
43	(TS="Treatment Outcome*") AND LANGUAGE: (English)	50762
44	(TS="Quality of Health Care") AND LANGUAGE: (English)	3739
45	(TS="Patient Care") AND LANGUAGE: (English)	41648
46	(TS="Professional Practice") AND LANGUAGE: (English)	6843
47	(TS="Patient Compliance") AND LANGUAGE: (English)	8373
48	(TS="Physician-Patient Relations") AND LANGUAGE: (English)	971
49	(TS="Patient-Centered Care") AND LANGUAGE: (English)	4403
50	(TS="Physician-Patient Relations") AND LANGUAGE: (English)	971
51	(TS="Safety") AND LANGUAGE: (English)	733692
52	(TS="Patient Satisfaction") AND LANGUAGE: (English)	32625



53	(TS="unintended event*") AND LANGUAGE: (English)	38
54	(TS="unintended consequence*") AND LANGUAGE: (English)	6011
55	(TS="Delivery of Health Care") AND LANGUAGE: (English)	2344
56	(TS="complaint*") AND LANGUAGE: (English)	65207
57	(TS="Inappropriate Prescribing") AND LANGUAGE: (English)	1149
58	(TS="Malpractice") AND LANGUAGE: (English)	7804
59	(TS="Risk Factors") AND LANGUAGE: (English)	555286
60	(TS="Empathy") AND LANGUAGE: (English)	21937
61	(TS="losing temper") AND LANGUAGE: (English)	4
62	#1-6 OR	32,175
63	#7-20 OR	1,961,076
64	#21-61 OR	2,365,858
65	62 AND 63 AND 64 AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article)	1,243

**A.2 Questions for eligible abstract screening:**

Studies will be eligible for full- text screening if they fully (“ YES” to each criterion) meet criteria 1, 2 and 3:

1) Is the study measuring burnout?

Yes / NO

Is it worth continuing?

2) Is the study covering patient outcomes?

Yes / NO

Is it worth continuing?

3) It is the study covering surgeons in any discipline?

Yes / NO

Is it worth continuing?

4) Is the study measure the link between surgeon’s burnout and patient?

Yes / NO

Is it worth continuing?

### A.3 Quality assessment tool and scoring guide

	Poor/High risk of bias	Average/Medium risk of bias	Good/Low risk of bias	Unknown/N.A
<b>Representativeness</b>	Self-selected sample from one site (and one ward), with a low proportion of eligible participants taking part	Self-selected sample, from more than one ward, with a medium proportion of eligible participants taking part	More than one site, high proportion of eligible participants taking part	
<b>Randomisation</b>	Self-selected participants	Recruitment sent to all/random sample of eligible participants, but <50% participated	Recruitment sent to all/random sample of eligible participants, but >50% participated	
<b>Blinding</b>	No blinding or incomplete blinding, which is likely to influence the outcome	Attempted blinding, but likely not carried out effectively	Outcome not likely influenced by lack of/broken blinding. Or, effective blinding.	
<b>Measure of patient safety/quality</b>	Measure developed for this study, with no mention of validity, reliability or piloting	Measure developed for this study, with attempts to display validation (e.g. concurrent validity)	Validated, well known measure OR new measure with validity and reliability displayed (e.g. more than one type of validity)	
<b>Measure of wellbeing/burnout</b>	Measure developed for this study, with no mention of validity, reliability or piloting	Measure developed for this study, with attempts to display validation (e.g. concurrent validity)	Validated, well known measure OR new measure with validity and reliability displayed (e.g. more than one type of validity)	
<b>Participants lost to follow up/Incomplete outcome data</b>	Participants lost, but no mention of differences between completers or non-completers. No intention to treat analysis on missing data.		Analysis to check for differences between completers and non-completers, with significant differences controlled for in main analysis. Intention to treat analysis for missing data	
<b>Confounding variables</b>	No evidence of attempting to account for possible confounding variables in analysis (or recruitment)	Accounted for basic potential confounding variables at either recruitment or analysis (e.g. Age, Gender)	Accounted for basic confounding variables and additional potential confounding variables, at either recruitment or analysis (e.g. Years in practice)	
<b>Power and effect size</b>	Power analysis reported, with below small effect size	Power analysis reported, with small - medium effect size	Power analysis reported, with medium – large/large effect size	

### A.4 The quality assessment tool for each study

	Representativeness	Randomisation	Blinding	Measure od wellbeing/burnout	Measure of patient safety/quality	Confounding	Power and effect size
Balch et al 2011	+	?	+	-	?	+	-
Coombs et al 2020	+	-	+	+	+	+	+
Crijns et al ,2020	-	+	+	+	+	+	+
Faivre et al.,2018	+	-	+	+	+	+	
Hewitt et al.,2020	?	+	+	+	+	?	
Kassam et al.,2020	?	+	+	+	+	-	
klein et al. ,2010	+	+	?	+	+	+	
Qureshi et al ,2015;	+	+	+	+	+	+	
Shanafelt, at el. 2010	+	+	+	+	+	+	+
Shirom et al.2006	-	+	-	+	+	?	
Soh et al.,2020			+	+	+	+	
Tsiga et al. 2017	?	+	+	+	+	+	
Walocha et al., 2013	-	?	?	?	?	+	
Windover at el, 2018	+	?	-	+	+	+	
Zheng et al , 2018	+	-	+	?	+	+	-

Low risk of bias  
 Average risk of bias  
 High risk of bias  
 N/A or unknown

## Appendix B

### Chapter 3/study 2 (Qualitative study )

#### B.1 Interview Schedule

##### Opening

Hello, my name is Tmam. I am a researcher at the University of Leeds. Is now still a good time to talk?

Before beginning this interview, I would like to give you some additional information about this research. I am interested in investigating the subject of surgeon wellbeing and burnout; I would like to determine which types of workplace factors cause surgeons to feel burnout, as well as how these factors can impact surgeons' work. This interview will also be used to help develop surgeons' wellbeing, and I plan to ask you some questions on this topic. This information is only intended for research purposes, and if there are any questions that you would rather not respond to, please feel free to decline to answer.

Concerning the time frame, this interview should take about 45 minutes to complete.

Have you have a chance to read participants form? (Verify that the participant is pleased with the information above and the information in participants consent form; if he/she desires to proceed, notify him/her that I will need to record his/her consent in taking part in the interview).

Beginning with general information, can you tell me a little bit about yourself (i.e. your demographics)? **[This section will not be recorded]**

- Are you happy to describe your gender?
- What stage are you at in your career?
- What is your speciality?
- What is your ethnicity?
- How long have you been working as a surgeon?

I will now begin recording this interview; is this okay with you?

##### **Defining Wellbeing and Burnout event surgeons experience at work (The aim of this section is to explore the feeling of burnout among surgeons)**

Are you familiar with the terms 'wellbeing' and 'burnout'?

If the answer is 'yes,' ask the following questions:

- How would you define wellbeing?
- How would you define burnout?

If the answer is 'no,' wellbeing is the condition of being contented, healthy or happy, whereas burnout is 'when someone experiences exhaustion and a lack of interest in things, resulting in a decline in their job performance.'

I will now ask you about your experiences.

##### **1-Do you think burnout is a concern for surgeons?**

**2-Do you think surgeons, in general, are aware of burnout and what can cause it?**

**3-A-Have you ever experienced burnout or poor well-being because of work?**

If the answer yes:

- Could you tell me a bit more about this – what was happening at work at the time?
- How recently was this?
- How long did this situation last for?

**Contributors to Burnout and source of help (The aim of this section is explore the main contributory factors that cause surgeons to feel burnout and the way they cope with it)**

- What was the main cause?
- Were there any other causes?
  - Any work influences? What kinds of things were happening at work?
  - Anything stressful happening in your personal life?
- What did you do to cope with these experiences?
  - Any work-directed strategies? (e.g., cutting hours/changing job)
  - Any personal or psychological strategies (e.g., trying mindfulness/ taking time for relaxation)
- How effective were these strategies? Would you use them again in the future?
- Did you receive any support from others?
  - Informal support from colleagues/family/friends?
  - Formal support from your organisation/professionals?
- How effective was this support?

**Impact of Burnout on Patient Care (The aim of this section to explore the main effect of surgeon's burnout on patient care)**

- In general, do you think burnout affects how patient care is delivered?
- So, coming back to that experience you were just telling me about, when you felt burnt-out, do you think it had any negative impact on the way you interacted with patients?

[If yes]

Which aspects of your job were affected? All aspects – or just some?

- In surgery? Conversations with patients and their families? Note keeping?
- Do you think it affected your decision making ability at all? (can you tell me about it)
- Did you experience any adverse events during that time? (it can be classified as Near miss-the event did not reach the individual-, non-harmful, harmful event or death)

- In general, do you think patient care is compromised when surgeons have burnout?

[If no]

We know that in general, healthcare professionals who are suffering from burnout or poor wellbeing are more likely to be involved in adverse events or to have dissatisfied patients. How did you prevent your experiences from affecting your patient care?

- What things did you do? Any psychological strategies?

*If the answer No:*

**3-b Have you ever experienced a time when you felt emotionally detached from your patients? Perhaps where you cared a bit less about their outcomes?"**

- Could you tell me a bit more about this – what was happening at work at the time?
- How recently was this?
- How long did this situation last for?

**Contributors to Burnout and source of help (The aim of this section to explore the main contributory factors make surgeon feel burnout and the way they cope with it)**

- What was the main cause?
- Were there any other causes?
  - Any work influences? What kinds of things were happening at work?
  - Anything stressful happening in your personal life?
- What did you do to cope with these experiences?
  - Any work-directed strategies? (e.g., cutting hours/changing job)
  - Any personal or psychological strategies (e.g., trying mindfulness/ taking time for relaxation)
- How effective were these strategies? Would you use them again in the future?
- Did you receive any support from others?
  - Informal support from colleagues/family/friends?
  - Formal support from your organisation/professionals?
- How effective was this support?

**Impact of Burnout on Patient Care (The aim of this section to explore the main effect of surgeon's burnout on patient care)**

- In general, do you think patient care is affected when surgeons feel detached from their patients?
- So, coming back to that experience you were just telling me about, when you felt detached from your patients, do you

think it had any negative impact on the way you interacted with patients?

[If yes]

Which aspects of your job were affected? All aspects – or just some?

- In surgery? Conversations with patients and their families? Note keeping?
- Do you think it affected your decision making ability at all? (can you tell me about it)
- Did you experience any adverse events during that time? (it can be classified as Near miss-the event did not reach the individual-, non-harmful, harmful event or death)

[If no]

We know that in general, healthcare professionals who are suffering from burnout or poor wellbeing are more likely to be involved in adverse events or to have dissatisfied patients. How did you prevent your experiences from affecting your patient care?

- What things did you do? Any psychological strategies?

**4-How do you think other surgeons are affected by burnout generally?**

**5- What things cause surgeons to feel burnout?**

**6-What things do you know other surgeons do to cope with burnout?**

**Closing**

I appreciate your time in participating in this interview. Would you like to add anything to your previous responses? I would also like to confirm where you would like your certificate to be sent. Thank you again; your responses will be very helpful.



## B.2 Themes, subthemes, examples from part one Thematic Analysis: The Main Factors that Lead to Surgeons Experiencing Burnout

Theme	Subthemes	Examples
Theme One: Rising to the challenge of surgical work	Unable to resolving challenges	<i>"Excessive pressure which opposes our ability to cope, I guess"(Interview 13).</i>
	Surgeons' High Expectations:	<i>"For consultant surgeons, the one of the things I have found is that you start off as a junior doctor and you think the higher up you go, you might think life will get a bit easier. And it doesn't. I describe it as climbing to the top of the pyramid and realising that the pyramid is upside down. And, all the stresses are now focused on you" (Interview 14).</i>
	Need admiration from others	<i>"So the other bits which come into being a surgeon, they are blacked out. So your performance goes off and you are constantly feeling under threat and you become very defensive" (Interview 2).</i>
	Bravado	<i>"I think you'll find there's no doubt talking to the surgeons is, to be a surgeon seems to depend on a degree of arrogance and overweening self-confidence to allow you to do what we do. And, of course, that's a really double edged sword" (Interview 4).</i>
Theme Two: Interpersonal conflict at Work	Conflict in Teamwork	<i>"Sometimes, surgeons aren't very nice to each other. You know, they could probably be a bit kinder to each other. Surgeons can be quite elitist.</i>

		<i>And sometimes people, you know, forget just to be nice"(Interview 12).</i>
	Working with an Unfamiliar Team:	<i>"when I started in '95 as a consultant, I had almost the same people with me for all my education. This is not the case anymore, and causes stress, which may lead to burn out of surgeons sometimes I can be impatient with stuff because you don't know who supports you in the clinic" (Interview 7).</i>
	Staff Incompetence	<i>" Time that I may feel stressed or in a rather low mood could be due to incompetence of staff, lack of results, cancellations on the day" (Interview 7).</i>
	Lack of Appreciation	<i>" feel that there is not much more work that you can do, especially with a little bit of lack of appreciation from colleagues or seniors. I think the main cause is lack of lack of appreciation, it's always the thing"(Interview 11).</i>
	Poor Management	<i>"there's a few managers, most of them previously doctors who have become managers who. One could swim for, who have kind of sort of ridiculous management dictums from one hymn, and I think that that is pretty stressful" (Interview 4).</i>
Theme Three: Greater demands than resources	Workload and a Wide Range of Demands	<i>"Work as surgeons can be quite a busy job, start in early mornings and late finish I think emotional exhaustion the most prevalent. I said getting tired. You know, very high workloads and maybe not enough staff members."(Interview 3).</i>

	Lack professional support	<i>"I don't think that we get enough support in clinics. You know, like doing the EPR. There's are so many issues there which we can understand that there is not enough support. So this causes stress, frustration and that leads to further stress. Unfortunately, there's no proper mechanism placed for support."(Interview 7).</i>
	Lack of Resources and Staff	<i>"There's not enough infrastructure in the hospital. The infrastructure is not sufficient for the amount of work we need to do. There's not enough beds, not enough surgeons, not enough consultants. We're under resourced and that contributes quite significantly" (Interview 9).</i>
Theme Four: The challenge of the work-life balance	Lack of a Work–Life Balance	<i>" I didn't have much of a personal life. I was living in the hospital. It was work, work, work and wasn't really anything much. There wasn't any personal life in those days for me" (Interview 11).</i>
	Lack of Time Off	<i>" Maybe a few days off here and there, but during at least the first three years of my neurosurgical training where I experienced rigour properly, there wasn't any remarkable holidays"(Interview 11).</i>
	Personal Life Issues	<i>"I got personal issues as well at home , that did not make things easy. That add pressure"(Interview 2).</i>
Theme Five: The devastating impact of errors and poor patient outcomes	Complications	<i>" think there was a lot of fear. And, I was at a point where I was junior. So, I didn't quite understand that complications happen no matter what you do. And, a complication did happen. I didn't really</i>

		<i>know how to deal with it, at that point in my career” (Interview12).</i>
	Dissatisfied patients	<i>” if patients aren't happy, though. No. Contribute even more to burnout” (Interview3).</i>
	Lawsuits	<i>”The other thing is it's very easy to start legal action because of all that. No. With no free peds. And so patients are much more likely to take a legal challenge, even if their challenge is ridiculous because they know that they don't lose any money”(Interview1).</i>

**Table 7.3 Themes, subthemes, examples from part two Thematic Analysis : How surgeons deal with or avoid burnout**

Theme	Subthemes	Examples
Theme One: Cognitive restructuring	Switching Off	<i>" that's how most people try to switch off, and not focus on work when they're not at work. I think that's probably the key thing"(Interview 9).</i>
	Practicing being grateful	<i>"I think you remind yourself why you were doing the job you are. And, be thankful of your job. So, I think that's easy to assume and take your job for granted, actually. But, you have to realise you are lucky to be in a position to have an insight into patients' lives, and have such a profound effect on them. I think they're starting to appreciate the work and the equipment that we have available in the NHS" (Interview 13).</i>
	Meditation	<i>"I did the meditation. I think meditation that helped me because basically self-doubt"(Interview 2).</i>
Theme Two: Seeking social support	Talking about the Problem	<i>"I tried to offload to some degree by talking to my parents. The more you talk, the more you feel a bit less stressed maybe. So, I would still call all this informal"(Interview 13).</i>
	Support from Friends or Family	<i>"My wife still tries to support me to a degree" (Interview 4).</i>

	Support from Colleagues	<i>"I remember when going and chatting to a couple of consultants in that department, where they kind of enlightened me to the point that the straining period in your life is just deficits."(Interview 11).</i>
	Support from a Manager	<i>"the first thing I did was once that we realized this was happening was actually speak to my head of clinical services and say, look, I think there's a problem here. And if we carry on with this, then, you know, it might have significant effects on me. And then at the same time, underserved, really, because, you know, I didn't want to be in a situation where I had to walk a long stretch, which would just make life even harder for everybody else. It's like a domino effect, you know what I mean? So we have a very good head of clinical services who was very happy not only to listen, but to actually try to do something about it and identify things. So, one of the things we've looked at is decreasing the number of clinical commitments, increasing support and actually opening a channel where you can speak to someone about things rather than having to deal with everything yourself" (Interview 14).</i>
Theme Three: Step aside or down from job	Reducing Work Hours	<i>"decreasing their clinical commitments is a major way people are dealing with that now"(Interview14).</i>

	Leaving or Changing Jobs	<i>"I was burnt out to a certain extent, and training to the point that I resigned, actually resigned. And then I came back at some stage. So, yes, I would say that I have experienced burnout. I was burnt out. I was overworked, overstressed. I definitely, you know, I hit rock bottom" (Interview 11).</i>
Theme Four: Prioritising personal health	Relaxation and taking "down time"	<i>"I'm getting a good night's sleep. I'm sure that helps" (Interview10).</i>
	Taking up hobbies	<i>"Another way I cope with stress is through following my day with my hobbies, go for a walk, or do some light exercises at the gym"(Interview 7).</i>
Theme Five: maladaptive coping	Heavy drinking	<i>"There was a consultant in this hospital (who is anonymous) became alcoholic and then lost life. No one was aware of the issues he was going through as he never really mentioned it to anyone" (Interview 7).</i>
	Smoking	<i>"I took up smoking, which is a stress relief" (Interview 12).</i>
	Drug abuse	<i>"I've seen a few surgeons turn a drugs"(Interview4).</i>

**Appendix C**  
**Chapter 4/study 3**

**Table C.1 Themes, subthemes, example of Thematic Analysis I: How does burnout effect surgeons personally?**

<b>Themes</b>	<b>Subthemes</b>	<b>Example</b>
<b>Theme One: Burnout Is Common but Frequently Not Recognized nor Understood</b>	Acknowledging that burnout is a spectrum	<i>"I think we all experience it to varying degrees. I experienced burnout in all of my training" (Interview 11).</i>
	Burnout is common for surgeons	<i>"I think Surgeons are more affected by burnout because of the nature of their work. Other specialties in medicine, there is evidence of burnout, there is a chance of burnout but because of the stress of the job as it is in surgical specialties. The burnout become much more prominent for us and much more often" (Interview 2).</i>
	Burnout can be subconscious	<i>"Maybe sometimes subconsciously, without realizing that they are burnt out. I think it can be overlooked sometimes" (Interview 11).</i>
	Wellbeing is the absence of problems	<i>"Wellbeing, in my definition, is the feeling that you are working without stress" (Interview 11).</i>



	Missing the shades of grey—the lower ends of the burnout spectrum	<p><i>"I expected my directors to give some advice as to how I can manage the situation, because I didn't I didn't recognize at that time that I was under a lot of stress.</i></p> <p><i>I expected my directors to give some advice as to how I can manage the situation, because I didn't recognize at that time that I was under a lot of stress" (Interview 5).</i></p>
	Surgeons disregard their burnout	<i>"They either person try to ignore or just think we surgeons doesn't happen to us" (Interview 1).</i>
<b>Burnout is a personal crisis (Strike out 'really strong negative experiences)</b>	Social isolation	<i>"Some people will become more reclusive and avoid all social events" (Interview 13).</i>
	Depression	<i>"I think it can lead to depression" (Interview 12).</i>
	Anger	<i>"I did have one thing where I told somebody to stop working on the computer, and come on help me please. I got cross at one moment. That was it. I apologized immediately" (Interview 10).</i>
<b>Theme Three: When Burnout Creates Vulnerabilities at Work</b>	Training is a vulnerable time	<i>"I was burnt out to a certain extent, and training to the point that I resigned. I experienced burnout in all of my training" (Interview 11).</i>
	The problem of surgeon burnout has increased recently	<i>"I think that especially with, you know, changes in pension law and so on, our careers are being made to be longer and longer than</i>

		<i>previously they were. And I think that that means you're going to have to deal with more change towards the end of your career"</i> <i>(Interview4).</i>
	Surgeons are more comfortable talking about burnout which occurred in the past.	<i>"The single most stressful event I've had was a complaint to the fitness-to-practice at GMC, by a patient. A lot of years ago. Probably 15 years ago" (Interview4).</i>

**Table C.2 Themes, subthemes, example of Thematic Analysis II: How Does Burnout Affect Surgeon Provided Care?**

Themes	Subthemes	Example
Theme one: The Effect of Burnout on Surgeon-Patient Relationships and Surgeon-Patient Communication	Surgeons do not follow up with patients because of burnout	<i>“If I’m stressed about this patient, I want to go and try. I am more worried about it, you know what I mean? I want to see them more. But, I’m not sure that’s a common and it’s certainly not a universal reaction. I’ve been aware of something that colleagues do, when things go wrong. They sort of turn their backs on the situation” (Interview 4).</i>
	Burnout affects patient communication	<i>“Obviously you become very defensive and yourself, whatever you want to do will not be able to do. And. That makes you feel that you are not complete. So it makes you feel a bit shaky. It makes you unsure about what you’re offering your patients and what to ask them to feel.it is effect on your performance, and if the complication which happen that of course you have to go and explain for the patients family, why this happen?, you know may be yes, it might affect the relationship, but it might affect the outcome”(Interview 2).</i>

Theme Two: Patient Safety (Burnout Increases the Risk of Errors)	Burnout negatively affects decision-making, especially with less experienced surgeons	<i>"When I was very tired, I wasn't as quick to make decisions as well as I normally would" (Interview 5).</i>
	Burnout affects patient harm and medical error	<i>"I felt that I don't want to be part of an unsafe practice, basically, and I resigned. Because it becomes unsafe, basically. It's not healthy for the surgeon and it becomes unsafe for patients as well" (Interview 11).</i>
	Note keeping	<i>"when people not interested probably they lazier and not do as much" (Interview 3).</i>
	Reduced learning from complications	<i>"You'd be less bothered by complications. I'd be less likely to reflect on the situation and think about the next time" (Interview 13).</i>
	Double checking is a strategy for patient safety from burnout	<i>"Well, I think certainly took extra time. I spent a lot longer with patients trying to explain stuff, than I normally would have done. Just cause it was taking me longer to explain basically. And, then it's just a case of checking and double checking, triple checking your notes, decisions, et cetera, that you actually documented the right thing, listed the right person for the right stuff. It's a case of double checking things" (Interview 5).</i>

Theme Three: Burnout Affects Staff Relationships (Burnout Negatively Affects	Surgeon burnout affects their relationships with family and colleagues	<i>" you're more likely to get angry at your colleagues or patience is shorter" (Interview 12).</i>
Colleague Interactions or Teamwork)	Surgeon burnout contributes to the use of ego defence mechanisms	<i>"Everyday life brings something that you will not always know how to cope with it, therefore one needs to be prepared and have various mechanisms to cope. Makers of defence mechanisms to fight for that sort of thing" (Interview 7).</i>
	Teamwork buffers the impact of burnout on safety	<i>"As I said, about having colleagues to be able to discuss cases with. If you discuss with colleagues that are understanding, then they can give you advice and point out areas where you might have to arrange a particular test or a way of doing things differently. It's about having good communication with your work colleagues, I think" (Interview 9).</i>
Theme four: Burnout Makes Surgeons Less Motivated to Improve	Less open to learn	<i>"So, when it's not perfect, usually I'll think about, maybe I'll change that and make small tweaks rather than big changes. So, I think it's all about thinking how you could be bothered about even the small complications, so that you can perfect it. So, if you are burned out, you don't think of that. It's about getting home quicker" (Interview 13).</i>

## Appendix D

### Chapter 6/Study 5

**Table D.1 Themes, descriptions, subthemes, example of how surgeons effected by COVID-19 pandemic.**

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"> <li>● Limited capacity</li> <li>● Change in work structure.</li> </ul> 2) Increased workload and lack of work-life balance  3) Surgeons struggling with Personal Protective Equipment (PPE).	<i>"Reduced capacity for operative surgery".</i>  <i>"Changing pattern of work and on call".</i>  <i>"Increased workload".</i>   <i>"Lack of PPE"; "PPE makes it difficult for patients to hear you and see your non-verbal response".</i>
Challenges to professional life and development	This theme describes how COVID-19 has affected surgeons' performance at work and their experience	1) Impact on surgeon's performance <ul style="list-style-type: none"> <li>● Difficult to make decisions.</li> </ul>	<i>"It is intellectually tiring to make decisions".</i>  <i>"Not being able to do my job"</i>

	of professional development.	<ul style="list-style-type: none"> <li>• Less productive/Work slow</li> <li>• Tired</li> </ul> <p>2) Impact on surgeon's development</p>	<p><i>adequately".</i></p> <p><i>"Make me feel tired".</i></p> <p><i>"Zero access to any training, either in theatre or clinic".</i></p>
Management of change and loss in personal lives	This theme describes the effects of COVID-19 on surgeons' lives outside work.	<p>1) Childcare issues</p> <p>2) Family life /relationship</p> <p>3) Having to cancel honeymoons/ weddings</p> <p>4) Reduced leisure opportunities</p> <p>5) Poor sleep</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>"Loss of communication with wife".</i></p> <p><i>"Wedding, honeymoon and annual leave cancelled".</i></p> <p><i>"Travel. The pub is shut and I can't go on holiday".</i></p> <p><i>"Some sleeplessness".</i></p>
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><i>"Fear of bringing virus home and infect[ing] my family and my mother in law with lung cancer"; "Increased anxiety about the future".</i></p> <p><i>"Often struggle to find motivation".</i></p> <p><i>"boredom"</i></p> <p><i>"Very much, started having irritability".</i></p>

		Stress and burnout	<i>"Feeling hopeless".</i> <i>"Very stressful both at home and work".</i> <i>"Burnout".</i>
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## **Appendix E**

### **Chapter 7/study 6**

#### **E.1 Follow-up Interviews with Participants**

##### **RESILIENCE and ERROR MANAGEMENT**

1. Can you describe to me your understanding of the concept of resilience?
  - a. Had you come across this concept prior to the online workshops?
  - b. Do you feel that you have a good understanding of the concept after taking part in the workshops?
2. To what extent do you feel that higher levels of resilience may help you in your professional practice?
3. Since engaging in the online workshop, how do you feel about your ability to cope with instances of error arising during your work?
4. To what extent do you think that being more resilient may help you to manage instances in which you have made a mistake in the course of your work?
  - a. In what ways, if any, do you think that being more resilient may help you?
  - b. Do you feel that the workshop has provided you with any useful skills for such instances?
5. To what extent do you feel that the skills developed are relevant and useful to your future career as a health professional?

##### **WORKSHOP and follow up phone-call/tutorial**

I'd now like to ask you a bit about your experience of the workshop.

6. What was your overall perception of the workshop?
  - a. Probe particular issues arising here
7. What did you think worked well?
  - a. Probe particular issues arising here
8. What could be improved?
  - a. Probe as to how improvements might be made
9. How did you feel about the online format?
10. How did you find discussing these issues in a group?

11. How did the workshops contribute to your learning and overall professional development in relation to resilience?

12. Overall, would you recommend this session to others undertaking your professional training?

*That brings us to the end of the question I have for you but do you have anything you would like to add or any questions for us? Thank the participant.*

**E.2; If you were involved in stressful workplace event, would you do anything differently as a result of attending this workshop?**

**If you were involved in a stressful workplace event, would you do anything differently as a result of attending this workshop?**

1. Use the techniques learnt to not beat myself up after stressful events.
2. Useful to consider shared responsibility, healthy coping behaviours.
3. Assertive communication. Not dealing with it.
4. Take time out to understand the situation better in order to give an appropriate response.
5. I have some strategies to help manage the stress of that situation
6. Yes, I would handle it myself.
7. Paying more attention to how I plan the rest of the day in order to allow myself to "de-stress".
8. I would do the pie chart, Self-care and postpone my worry.
9. Yes, inquiry and doing something I have learnt from the workshop.
10. Use short-term and long-term strategies. Make a pie chart on blame assertion.
11. Breathing exercises and trying to stop the negative thoughts by counteracting them with more positive interpretation.
12. Apply more of the postponing worry.
13. Avoid discounting the positive.
14. Take more time to focus on some of the contributing factors. Reflect on positive events to boost self-confidence.
15. Be better equipped to recognise your own behaviours and tendencies and hence be able to break the cycle.

### E.3 Example of themes and Sub-themes to evaluate the Reboot-C workshops on urology trainees.

Themes	Sub-themes	Example
<b>Deeper understanding</b>	Raises awareness and personal understanding	<p><i>"I think putting that into a sort of what that activity is part of a negative thought pattern. So, then you can cope with it better by recognizing what you're doing. I don't know if that makes sense" (Interview 6).</i></p> <p><i>"I feel like I'm more able to recognize the negative thoughts and patterns and to try and overcome them by being aware of them and to have certain strategies" (Interview 3).</i></p>
	Better understanding of other people	<i>"I think it helps my resilience and also, I think it helps me understand that of my team as well and how to support my team better"(Interview 4).</i>
	Increased self-esteem/more positive self-view	<i>"I've been using the tools that we learned in the workshop about how to value the self in different ways" (Interview 2).</i>
<b>Reboot workshops as providing a toolkit</b>	Build a coping strategy toolkit/	<p><i>"I think with the help of resilience you'll be able to correct your past mistake and also, those things that you feel it was difficult to do in your life, you'll be able to do it like you will be able to make it easy" (Interview 8).</i></p> <p><i>"I think it's more than skills, it's just helped make a path and steps to take. If you know when I do make a mistake that I can follow" (Interview 9).</i></p>
	Reboot as improve – gratitude diaries as tool of the reboot workshop	<i>"There was a lot of helpful tools or strategies to manage negative habits. So like, practicing gratitude" (Interview 1).</i>
	Practicing postpone worry as Reboot tool	<i>"If I'm operating, there is a mistake in one case, it will help me at least clear my mind by delaying the worry and focus on the next case" (Interview 2).</i>

	Helps prepare surgeons for errors and AEs	<i>"We have either made errors or you know, difficult situations and I think this will definitely help me with previous events and future events" (Interview 6).</i>
	Benefit of 'homework'	<i>"Whole different coping mechanisms and how we would implement those and try to actually use it and see if that makes any difference" (Interview 6).</i>
	Exercise to applying resilience / Benefit of practical exercises	<i>"And those basic exercises that were done when just reinforced my understanding" (Interview10).</i>
<b>Peer to peer interaction and engagement</b>	value of peer engagement and support	<i>"I like the fact that we worked through the examples together as a group. We had different people putting in different ideas and inputs about how they manage these situations. And also I liked how, as a group, we work through the cases to try and point out where the mistakes were, and where they can be rectified and how so". (Interview 9)</i>
	Small group, more accessible interactions	<i>"I thought it was quite good that it was fairly small groups. I think we basically just had like eight or nine people, so I think that was quite good" (Interview 3).</i>
	Benefits of online - accessibility	<i>"I do like the Online. I think it is valuable. And it makes it easier to take up such an opportunity for example, particularly as something that's done on a regional scale, and maybe even had people from much wider than just the region of Yorkshire. But if people were traveling to such a workshop in person, you would spend, you could spend the same amount of time traveling as you do in the workshop, one hour there and one hour back, and it would reduce one's interest in going in person" (Interview 7).</i>

	Disadvantages of doing it online/in-person would encourage personal disclosures and peer-to-peer sharing	<i>"The only problem I have about online, I think is better, but the problem I had was during the focus group, you'd notice that some people were not responding. That will show that they weren't in the call. They were doing something else. They were listening and might just be there just for another reason. So that's, that's how I feel about the online session. So if it was more of in person than you'd see, you'd notice that people will be focus, they will listen, because then they're looking at the person but it's more online. So that's the only problem I have with online, but then when it comes to being comfortable when it comes to being accommodating, I'd say it's, it's really great" (Interview 12).</i>
<b>Left wanting more</b>	Having One to one session with therapy/coaching.	<i>"I felt if I'm talking to one trainer or one lecturer talking to me will make me open" (Interview 1).</i>
	Extend the workshops with more details.	<i>"I feel there is still more to learn. If they could put in more hours, maybe make it up to three hours. So one could learn more, because from what I saw, the host was really time conscious. Most times It looked as if she was a rushing, um, so she could meet up on the two hours. So what I would say is they should put in more time to this sort of workshop because it is really helpful" (Interview11). "I think the information in the workshop should be more pit" (Interview 13).</i>
	More breakout session	<i>"I think having more of a breakout session because I noticed on the second workshop, we did a breakout session. Where we disconnected from the right person, we went into the small subgroups, and suddenly the conversation flows a bit better. I don't know if people were just intimidated by having a larger</i>

		<p><i>group or having someone who's an expert in the area and They're worried. But I felt like the conversation was a bit better in that sense. I don't know if integrating that a bit earlier on might help people relax and engage a bit more" (Interview 5).</i></p>
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