

Burnout in NHS Surgeons

a systematic review and narrative synthesis of
risk-factors, effects, interventions and
implications for stakeholders

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Reviewers

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Abstract

- Background:** The term ‘burnout’ was first coined in 1974 after it was observed that some healthcare volunteers followed a similar pattern of becoming emotionally tired and losing motivation in their work after unsuccessfully treating patients. Research after these initial observations has improved current understanding of how burnout is developed. Typically, burnout is defined as the end of process of disillusionment with a job where the person becomes less effective in their role.
- Introduction:** Burnout amongst National Health Service (NHS) surgeons in the United Kingdom (UK) is likely to be negatively impacting the health of those surgeons and the quality of patient care they provide. Leaders appear to have only recently recognised how significant the effects of burnout in surgeons may be. There is no review that holistically explores burnout in this group or what can be done to mitigate the impact of burnout.
- Aims:** The primary aim was to estimate the prevalence of burnout amongst NHS surgeons between 2000 and 2018. Secondary aims were to evaluate the risk factors, effects and interventions for burnout in NHS surgeons between 2000 and 2018.
- Methods:** A systematic review was conducted between 21st January and 18th June 2019 according to the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) guidelines and registered on PROSPERO (registration number CRD42019119900). MEDLINE and Health Management Information Consortium (HMIC) databases were searched for eligible studies. The Appraisal Tool for Cross-sectional Studies (AXIS) was used to critically appraise the quality of studies. Quantitative analysis and qualitative synthesis of results was performed but no meta-analysis was performed due to substantial study heterogeneity.

Results and discussion: There were 2,796 search results returned. After title and abstract screening and full-text review, 10 studies were eligible for inclusion. Included in the analyses were 2,130 surgeons across many surgical specialties. No definitive prevalence rate could be calculated because of varied definitions of burnout. However, by qualitatively synthesising all available prevalence estimates, approximately one third of surgeons appear to have burnout. Many risk factors were identified but centre around a surgeon feeling unable to utilise their professional skills or having a weak support network with inadequate coping strategies. The effects of burnout are wide-reaching and appear to negatively affect surgeons' health and ability to deliver effective patient care. Individual-focused and organisation-level interventions appear to be able to reduce burnout but require further research to determine the optimal mix and frequency of interventions in the long-term.

Conclusion: Burnout affects approximately one third of NHS surgeons and negatively impacts the surgeons' health and the quality of patient care they provide. Ensuring trainees' have realistic expectations of what it means to be a surgeon and improving collaboration between organisations and individuals to help create supportive work environments will likely reduce burnout rates.

Recommendations for stakeholders

For surgeons:

Surgeons should aim to approach their role with realistic but not romanticised expectations of the nature of modern surgical work and the quality of care they can deliver to patients. Having realistic expectations will help a surgeon prepare for working conditions which are sometimes adverse.

When work is inevitably challenging, a surgeon must already have in place healthy coping behaviours to help them manage. These may include (but are not limited to) having supportive friends and family who can discuss problems, exercising regularly, having hobbies, sleeping enough, avoiding non-prescription drugs, limiting alcohol intake and maintaining a healthy diet.

If someone feels emotionally drained, mentally detached from their work or does not feel like they accomplish what they want from their work, they should reach out to those who usually support them rather than becoming more withdrawn.

For patients:

Some may be surprised that patients can help to reduce burnout.

Patients can help to reduce burnout by recognising the limitations of what is possible for the surgeon both as an individual and as part of an organisation. By understanding the limitations, realistic expectations are more likely to form which may help the surgeon feel less emotionally drained and more successful in their role. This is because the surgeon

will likely feel they are able to deliver the standard of care that the patient expects.

For clinical leaders:

Clinical leaders are recommended to take two main actions.

First, they should be aware of the symptoms of burnout and proactively but informally screen for these symptoms in their team members.

Proactive screening is necessary because people with burnout become more withdrawn from their work and are likely to slip under the radar.

Second, clinical leaders should make substantive efforts to consider the most appropriate mix and frequency of interventions for their local context to protect against burnout and implement these accordingly.

Additionally, clinical leaders should regularly reflect on whether they themselves are developing burnout.

**For organisational
leaders:**

Organisational leaders are recommended to take two main actions.

Broadly, organisational leaders should promote behaviours that encourage staff to support one another to protect against burnout.

More specifically, organisational leaders should appreciate that there is no 'magic bullet' to stop burnout. Instead, a variety of organisational-level and individual-level interventions over the long-term are likely to be more successful at reducing staff burnout rates than sporadic or isolated interventions.

For regional-level and national-level leaders:	Regional and national leaders are recommended to ensure undergraduate and postgraduate surgical training realistically reflects the nature of a modern surgical career. The practical implementation of ‘professionalism’ must also be rebalanced to ensure surgeons are better able to recognise their humanity and personal weaknesses. This may encourage more surgeons to seek help when necessary.
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List of abbreviations

aMBI	Abbreviated Maslach Burnout Inventory
AXIS	Appraisal Tool for Cross-Sectional Studies
BMA	British Medical Association
BME	Black and minority ethnic
BMJ	British Medical Journal
BSMS	Brighton and Sussex Medical School
BSUH	Brighton and Sussex University Hospitals NHS Trust
CY	Cynicism (DP alternative for the MBI-GS)
DP	Depersonalisation
EE	Emotional exhaustion
EWTD	European Working Time Directive
EX	Exhaustion (EE alternative for the MBI-GS)
GMC	General Medical Council
GP	General practitioner
HEE	Health Education England
HMIC	Health Management Information Consortium
ICD-11	International Classification of Diseases 11
JCST	Joint Committee on Surgical Training of the United Kingdom and Ireland
LTFT	Less than full time
MBI	Maslach Burnout Inventory
MBI-GS	Maslach Burnout Inventory General Survey
MeSH	Medical Subject Heading
MMC	Modernising Medical Careers
NHS	National Health Service
O&G	Obstetrics and gynaecology
OR	Odds ratio
PA	Personal accomplishment
PE	Professional efficacy (PA alternative for the MBI-GS)
PRISMA-P	Preferred reporting items for systematic review and meta-analysis protocols
ProQOL V	Professional Quality of Life Scale V
PROSPERO	International Prospective Register of Systematic Reviews
UAB	University of Alabama at Birmingham
USA	United States of America
UK	United Kingdom
WHO	World Health Organization

Background

History of the term 'burnout'

A collection of symptoms has been described throughout recent history that is now formally recognised as a condition called burnout.

In 1901, the author Thomas Mann wrote *Buddenbrooks* which describes the gradual failure of a fictitious German business and the business owner's subsequent emotional exhaustion, loss of passion and loss of idealism for his work after trying to keep his faltering business afloat.(1)

A similar set of symptoms was described in 1953, when Schwartz and Will interviewed a psychiatric nurse.(2) The nurse was satisfied by her work when she was able to maintain constructive but emotionally challenging relationships with patients in need. However, when she had difficult patients, some of the relationships broke down. Failed relationships meant the nurse felt unable to help these patients, despite her best efforts, and labelled them as 'hopeless'. Since she felt unable to help, she would feel guilty and cognitively withdraw from her work to minimise the emotional burden from feeling of guilty. However, this also resulted in her caring less effectively for 'hopeless' patients.

The first example of organising these symptoms into a distinct condition came from a clinical psychologist called Herbert Freudenberger in 1974 who worked in the USA at free health clinics for the poor.(3) He noticed the many volunteers followed a similar pattern of gradually becoming emotionally tired and would lose motivation in their work after about one year, much like the psychiatric nurse. He applied a term colloquially used to describe effects of chronic drug abuse to the volunteers who followed this predictable pattern, 'burnout'.

At a similar time in 1976, an American social psychologist called Christina Maslach was researching how people became detached from their work as a self-defence mechanism.(4) She discovered that

her work shared many parallels with Freudenberger and her subsequent work helped cement the use of the word burnout.

It is thought that the term burnout only became popular after 1974 because of specific pattern of economic, social and technological factors. Cherniss suggests that, “the tendency toward individualization in modern society” has caused modern workers to become more alienated from their communities.(5) Complementary to this, Farber suggests that, “workers have become increasingly disconnected and alienated from their communities, and increasingly insistent on attaining personal fulfilment from their work...a perfect recipe for burnout”.(6) This combination is a recipe for burnout because when work inevitably does not fulfil the unrealistic expectations of the worker, the worker’s disconnection from their community means they will be less able to cope with the subsequent stress. Also helping the popularity of the condition was that after Freudenberger’s work in 1974, a term unified the discussion on the phenomenon: burnout.

Is burnout an inevitable consequence of healthcare work and was discovered by Freudenberger or is it a socially constructed concept? Burnout was coined after Freudenberger used inductive reasoning to understand a pattern of symptoms he noticed in volunteers which meant burnout originated as a social issue, not a scholarly construct. Most authors believe that because burnout describes a defined set of symptoms which seemingly occurred before use of the term, burnout is an inevitable consequence of healthcare work, which is explored in the following two sections. However, following recent overuse of the term burnout, many have grown disconnected from its etymology. The chronic misuse of the word ‘burnout’ and conflating it with similar but different psychological concepts led one psychiatrist in the *New York Times* in 2019 to ask, “Is ‘burnout’ real?”(7)

Defining burnout

Attempts have been made to classify burnout as a separate phenomenon from conditions which may share overlapping features, such as stress, depression or fatigue.(3,8,9) Some authors argue that burnout is a sub-type of depression: they believe it does not constitute a separate condition

because they suggest it was arbitrarily discovered.(8) However, the majority believe that burnout is a distinct condition. Opponents of the 'depression sub-type theory' argue that burnout is a separate condition because it is limited to occupational spaces whereas depression is pervasive across all aspects of life.(9) Freudenberger makes this differentiation in his seminal work on burnout by suggesting it is possible to reduce burnout by taking a long-break away from work.(3)

In 1980, Freudenberger and Richelson defined burnout as:

"To deplete oneself; to exhaust one's physical and mental resources; to wear oneself out by excessively striving to reach some unrealistic expectation imposed by oneself or by the values of society."(10)

Freudenberger and Richelson define burnout as an outcome of a process where a highly motivated individual fails to meet impossibly high expectations.(10) Although their definition does not explicitly state burnout occurs in an occupational setting, this is implied within Freudenberger's work.(3) However, their processual definition differs from the most widely cited definition in use from Maslach and Jackson in 1986:

"Burnout is a syndrome of emotional exhaustion, depersonalization and reduced personal accomplishment that can occur among individuals who do 'people work' of some kind."(11)

Unlike Freudenberger, Maslach and Jackson do not define burnout by the process by which it comes about but instead focus more on burnout as a syndrome with characteristic symptoms. They suggest that burnout only occurs in those who do 'people work' because these workers are thought to be particularly susceptible to want to derive existential meaning from their work, which is a disputed concept.(6,9) Maslach and Jackson's definition is probably the most cited because this definition accompanies the Maslach Burnout Inventory (MBI), which is the most widely used tool to measure burnout.

Two other notable definitions exist. First, by Cherniss:

“Burnout is a process that begins with excessive and prolonged levels of job tension. This stress produces strain in the worker. The process is completed when the workers defensively cope with the job stress by psychologically detaching themselves from the job and becoming apathetic, cynical, and rigid.”(5)

Similarly to Freudenberg and Richelson, Cherniss suggests that burnout is the whole process of decline rather than just the outcome.(5,10) Cherniss also uses the word ‘excessive’ which is conceptually similar to Freudenberg and Richelson’s idea of ‘unrealistic’ expectations. Cherniss highlights other familiar concepts such as psychological detachment and cynicism seen in Schwartz and Will’s case study of the psychiatric nurse.(2) Unlike Maslach and Jackson, Cherniss does not explicitly state that burnout only occurs in those who do ‘people work’.

The final definition is, by Edelwich and Brodsky:

“A progressive loss of idealism, energy and purpose experienced by people in the helping professions as a result of the conditions of their work.”(12)

They classify burnout similarly to Cherniss, Freudenberg and Richelson but contrasting to Maslach and Jackson by describing burnout as the process rather than outcome. Similarly, to Maslach and Jackson, Edelwich and Brodsky say that burnout only occurs in those who work with people, but they go a step further to suggest it only occurs in those who help others.

These definitions share similar parallels. They all suggest that for someone to ‘burn out’, they must first be ‘on fire’ by having unattainably high expectations for their work to deliver a sense of existential meaning and purpose to their life. The definitions describe the process of disillusionment in a job, where the person is disappointed their work is not what they thought it would be, therefore, extinguishing that person’s ‘fire’. This process results in an outcome where the person is less effective at their work.

Some use the term burnout to describe both the process as well as the outcome, while others use burnout only to describe only the outcome. Whilst both definitions are valid, burnout is mainly recorded in modern literature as the outcome of a process. It is during this outcome where symptoms appear to be most strongly experienced. Therefore, burnout will subsequently be used to describe only the outcome and not the process to reflect the symptoms someone will be experiencing at that time. People will be referred to as 'having burnout', rather than in the process of 'burning out'.

The most recent definition was created in 2019 when the World Health Organization (WHO) voted to formally classify burnout as an occupational phenomenon, not a medical condition, and is now included in the International Classification of Diseases 11 (ICD-11).(13) The ICD-11 suggests three core features of burnout are: feeling exhausted, greater detachment from work and reduced work efficacy.

Differentiation from similar phenomena

Burnout versus stress

Stress is usually categorised as being either systemic, psychological or social and can be experienced by everyone.(14) This is in comparison to burnout which can only be experienced by people who are highly motivated with high expectations and want to derive existential meaning from their job.

People in a demanding job can flourish under stress. However, a worker whose meaning in life depends on their ability to help others cannot flourish when they feel unable to help others. Their inability to help others may be worsened by stress but it is not necessarily caused by it.

Burnout versus depression

Depression, unlike burnout, is all-pervasive across someone's life and significantly affects that person's ability to function in all areas of life.(15) However, if someone has burnout, they can be productive and happy outside of their work.

Burnout versus physical fatigue

People who are physically fatigued, such as after exercise, usually feel positive feelings of accomplishment. Since their fatigue is purely physical, they also recover quickly.(9) Some people who have burnout may feel physically fatigued, but a major difference is they do not feel accomplishment, instead feeling like they have failed.(9) Also, since the cause of their fatigue is not purely physical, their recovery takes longer.

Introduction

Some surgeons feel like they are part of a 'destiny community', where they themselves and those around them become surgeons because it is their calling, rather than treating the profession like a 'normal' job.(16) Surgery also has a culture of competition and has one of the highest competition ratios for postgraduate training in both the UK and USA.(16–18) Since people feel like surgery is a calling, it is possible surgical jobseekers may disregard the quality of their working conditions in a way a 'normal' jobseeker would not. Therefore, surgeons may be more likely to encounter poor working conditions, and subsequently feel less supported and unable to effectively utilise their professional skills and develop burnout.

It is also thought that burnout can spread in an organisation through 'emotional contagion' by three methods.

*"Burnout in human services is like **staph infection** in hospitals: it gets around... perhaps it should be called a **staff infection**."*(9)

First, research on emotional cognition theory has demonstrated that positive and negative moods, such as the negative mood of someone with burnout, can spread throughout a network of individuals.(19) Second, someone with burnout can act as a model for others in the group. Others may look at someone with burnout and rationalise that because they work in the same conditions as the person with burnout, which is an occupational condition, it is likely that they also have burnout.(20) Third, someone can hear about burnout, learn about the symptoms and begin to look inside themselves for those symptoms. Eventually, the person generates the symptoms they were looking for, making a self-fulfilling hypothesis.(9)

After people develop burnout and realise it is at least partly caused by their work, they may conclude it is time to leave their job. As Freudenberger suggested, people who have burnout should

take long-term leave from their work to recover.(3) This train of reasoning may be partially responsible for declining workforce retention for UK surgeons.(21)

The quality of patient care delivered by a surgeon who has burnout is worse than a surgeon who does not have burnout.(22) In addition to worsening patient-surgeon interactions, there is likely to be worse quality of care throughout the whole system if less surgeons are available to help patients due to taking time out of work to recover from burnout.

Most healthcare leaders did not predict burnout as the outcome of a gradual society shift towards individualism as described earlier by Cherniss.(5) Even if isolated leaders did predict burnout as the outcome, only very recently have unified efforts been made to appropriately address this issue.(21,23) Leaders with strong change management skills have the potential to correct this downwards spiral of surgeon burnout and worsening patient care if they correctly understand the problem and what should be done to mitigate it.

For these reasons, this dissertation explores the current state of knowledge on burnout in UK surgeons and makes recommendations to stakeholders aimed at reducing the prevalence and mitigating the impact of burnout.

Literature Review

A literature review was performed after the initial idea to conduct a systematic review into burnout in UK surgeons, but before the final methods were decided. This review, outlined below, helped to understand the current state of knowledge in field and informed all parts of the final methodology.

Search strategy and search results

This review broadly aims to answer a question about a specific condition (burnout), in a specific population (surgeons), in a specific location (United Kingdom). Using these three features as a foundation, combined with the knowledge that surgeons may be grouped together with doctors in general, the following searches were performed. In December 2018, PUBMED was searched for:

"burnout surgeons UK" <i>with review only filter</i>	→	7 results
"burnout surgeons UK"	→	21 results
"burnout surgeons" <i>with review only filter</i>	→	30 results
"burnout doctors UK" <i>with review only filter</i>	→	17 results
"burnout doctors UK"	→	112 results

PUBMED was chosen to be searched because it is one of the largest reputable medical databases in the world so would likely return relevant results. In addition to PUBMED, Google Scholar was searched because Scholar ranks results based on number of citations. Although a flawed system, a high number of citations conveys a high level of interest in the publication. For this, reason, only the first page of Google Scholar results was reviewed (10 results per page) as this page contained the most cited publications. The searches performed in Google Scholar were the same as in PUBMED.

Existing reviews

No existing reviews of burnout in surgeons were identified that adequately explored the prevalence of burnout across UK surgeons, the risk factors or effects of burnout.

One review looked specifically at UK surgeons.(24) However, the scope of this review was beyond burnout and considered all occupational health problems such as a noise induced hearing loss, sharps injuries and many more. The broad scope resulted in a truncated and superficial discussion of burnout. Burnout was also incorrectly conflated with other psychiatric morbidities, such as depression, that have distinct aetiologies but sometimes overlapping features.(9) This review did not adequately explore the problem of burnout in UK surgeons or make recommendations detailed enough to make actionable changes.

One review explored burnout in UK doctors.(25) This review also considered psychiatric morbidity but correctly differentiated between this and burnout and compartmentalised findings when appropriate. However, as this review explored UK doctors more broadly, surgeons as a distinct sub-population were not discussed. This is a problem because some findings may have inappropriately been generalised to surgeons and occupational specific risk factors and effects could have been lost. Also, the study had several methodological issues as some parts were not reported in accordance to PRISMA guidelines available at the time of publication.(26) For example, the full search strategy was poorly described and there was no description of how many reviewers reviewed articles or extracted results.

More reviews on burnout exist for all surgeons internationally and some exclusively to American surgeons.(27–30) However, these reviews reflect different occupational environments and because burnout is an occupational condition, generalising these results to UK surgeons specifically may lead to incorrect conclusions and recommendations that would be less likely to arise if UK surgeons alone were considered.

Existing primary studies

Three studies retrieved only looked at one speciality in isolation.(31–33) Primary studies limited one speciality are helpful to understand specific occupational risk factors and effects for that surgical

speciality alone. Two primary studies retrieved considered burnout across multiple UK surgical specialities.(34,35)

However, when these studies are considered in isolation, both single-speciality and cross-speciality studies share weaknesses. These studies only partially explored the phenomenon of burnout and were limited by low journal word counts that do not allow for a thorough exploration of the phenomenon. Varied author knowledge on burnout also resulted in differing methodological quality. Together, these two limitations for primary studies result in a fragmented and inadequate view of burnout in UK surgeons.

Outcome of the literature review

No systematic reviews or other forms of reviews identified by the literature review adequately explore how common burnout is, its risk factors or effects to make accurate and actionable recommendations to reduce the burden of burnout.

Primary studies explore the prevalence of burnout and begin to explore its risk factors and effects but are often confined to one speciality. When these studies are considered in isolation, they offer a fragmented view of the issue of burnout. However, when the primary studies are considered together, there is the potential to offer a holistic view on the issue of burnout and provide useful recommendations to stakeholders. For these reasons, a systematic review will be conducted.

Aims

Primary Aim

To establish the prevalence of burnout in NHS surgeons in the UK between 2000 and 2018.

Secondary Aims

To evaluate the risk factors for burnout in NHS surgeons in the UK between 2000 and 2018.

To evaluate the effects of burnout in NHS surgeons in the UK between 2000 and 2018.

To evaluate interventions to protect against burnout in NHS surgeons in the UK between 2000 and 2018.

Methods

This systematic review has been designed and conducted in accordance with the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 guidelines.(36)

Registration

In accordance with the PRISMA-P 2015 guidelines, this systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO) on 21 January 2019 and was last updated on 05 June 2019 (registration number CRD42019119900). The full PROSPERO entry can be seen in Appendix 1.

Eligibility criteria

Studies eligible for review were selected according the eligibility criteria below.

Study designs

All types of studies that collected primary data were eligible for review. This decision was made because other eligibility criteria, such as population, setting and condition, were considered to be so narrow that it would be unlikely that sufficient studies would be eligible to draw meaningful conclusions if specific study designs were excluded.

The nature of the primary aim, establishing the prevalence of burnout, was best answered using quantitative methods such as cross-sectional studies. However, a variety of study designs beyond cross-sectional studies were thought to be insightful to explore secondary aims such as risk factors, effects and interventions for burnout.

Population

The population of interest was surgeons who work in the NHS.

A surgeon was defined as someone who holds a specific position in a specific speciality.

For position, someone who holds any of the following positions: core surgical trainee, specialist surgical registrar, surgical fellow, speciality or associate specialist surgeon, consultant surgeon or professor of surgery.

For speciality, in addition to holding one of the positions above, someone who works in any of the 10 surgical specialties recognised by the Joint Committee on Surgical Training (JCST) of the United Kingdom and Ireland (cardiothoracic, general, neurosurgery, oral & maxillofacial, otolaryngology, paediatric, plastic, trauma & orthopaedic, urology and vascular) or who works in obstetrics & gynaecology (O&G) or ophthalmology, both of which also perform surgery.(37)

If study results were reported for a group which included NHS surgeons but was not exclusively NHS surgeons (e.g. a group which contained NHS medical doctors as well), such groups were excluded from the burnout prevalence analysis. However, results from these groups were included in the qualitative synthesis if all participants in the wider group were clinical NHS staff.

These wider groups were excluded from the quantitative prevalence analysis because the primary aim for the review was to determine an accurate prevalence calculation in this population. However, the wider groups of clinical NHS staff were used in the qualitative synthesis because risk factors, effects and interventions for burnout which were relevant to NHS clinicians were likely to be relevant and of interest to readers of this review and potentially applicable to NHS surgeons alone.

Interventions

Use of an intervention was not a requirement for a study to be reviewed. However, if any intervention was used to protect against burnout or mitigate the effects of burnout in an otherwise eligible study, the nature of the intervention and any outcomes were recorded.

Comparators

As the primary aim of this review is to establish the prevalence of burnout, no comparators were required to be eligible for review. However, if comparators were included within a study as factors

that influenced risk of developing burnout or an effect of burnout, these comparators were recorded.

Data items

The following data was extracted from studies.

Study details:	author(s), year published, title
Methodological information:	study design, study period and study location
Participant data:	participant number, response rate, age distribution, sex distribution, surgical speciality distribution, surgical grade distribution
Burnout data:	burnout tool, burnout definition, burnout prevalence, risk factors for burnout, effects of burnout, interventions against burnout

Primary outcome

Prevalence of burnout; the tool used to score burnout and the cut-off definition used for having burnout.

Secondary outcomes

Any factor or variable used to evaluate risk of burnout and the relative risk it conveys of having burnout.

Any factor or variable used to evaluate the effect of burnout and the size of the effect.

Any interventions used to protect against burnout or mitigate the effects of burnout; the nature of the intervention and the magnitude of its outcome(s).

Timing

Studies that were published between 1st January 2000 and 31st December 2018.

Studies published before 2000 will not be included because they predate The NHS Plan, a seminal policy document published in 2000 that was considered to have substantially changed the culture

within the NHS.(38) The different organisational culture before and after 2000 means that comparisons of burnout research pre-2000 and post-2000 would reflect different organisational cultures and would likely make the results of this review less valid.

The endpoint of 31 December 2018 was chosen as an arbitrary cut-off that correlated well with the Master's degree requirements.

Setting

Studies were included that evaluated surgeons who practice in the NHS in the United Kingdom. For the purpose of this study, the UK was defined as England, Wales, Scotland and Northern Ireland only.

The United Kingdom was defined as such because British Overseas Territories and The Crown Dependencies operate a different healthcare system to the NHS that will not be comparable.

Language

Only articles with full text available in English were included.

The reviewer can only read English and funding for a translator service was not available.

Information sources

The information sources used were informed by the literature review.

Ovid® by Wolters Kluwer was used to search MEDLINE (1946 onwards) and Health Management Information Consortium (HMIC) (1979 onwards).(39) The database search will be supplemented by reviewing the references of eligible studies for additional studies.

MEDLINE and HMIC were determined to contain the most appropriate studies to answer the aims of the review following the literature search. No additional databases were searched due to time and resource limitations. References will be reviewed because they have a high probability of being relevant to answering the primary aims if they were also relevant to the authors of eligible studies.

Search strategy

The search strategy was informed by the literature review and developed with help from a medical librarian from BSUH. The full search strategies can be seen in Appendix 2 and 3.

Time limits were applied to both database searches to only show studies published between 2000 and 2018.

Search terms were devised for MEDLINE by looking at existing systematic reviews on burnout in surgeons and occupational stress in healthcare workers which published their search criteria.(40,41) Using these studies as template, the Medical Subject Headings (MeSH) browser was searched for all related terms to the aims of the review.(42) All extracted MeSH headings were then added to the search strategy as keywords. Next, any additional terms that were not covered by the MeSH headings were added as keywords. Finally, with the help of the medical librarian from BSUH, the search strategy was refined and consolidated into its final iteration.

The HMIC search strategy was devised using the same technique but instead of using the MeSH browser, MeSH terms were entered into the built-in OVID thesaurus to find the equivalent HMIC headings.

Deduplication

No inter-database deduplication was performed. However, Ovid® automatically performed deduplication within a database's results that was not possible to stop.

Whilst deduplication performed using software such as EndNote is accurate, it is still imperfect (sensitivity 51%, specificity, 99.75%).(43,44) Therefore, although more time-consuming, avoiding deduplication can lead to a more accurate review.

Selection of studies

ES reviewed studies to include according the eligibility criteria. When necessary, supervisor GW or CB was contacted if ES was uncertain about whether to include a study.

Data extraction and management

Eligible studies had information relevant to the review extracted by ES onto a made-to-measure spreadsheet. The headings of this spreadsheet were reviewed by the Dissertation Panel, Department of Medical Education at BSMS.

Assessment of risk of bias

Risk of bias assessment for cross-sectional studies was conducted by ES using the Appraisal Tool for Cross-Sectional Studies (AXIS).(45) The full AXIS tool can be seen in Appendix 4. The AXIS tool has been used to critically appraise cross-sectional studies in existing systematic reviews and was established by an international Delphi panel consensus in 2016.(46,47) Although all study types were eligible for inclusion, the only studies that met all other eligibility criteria happened to be cross-sectional. Therefore, no other study appraisal tools were used.

Handling overlapping publications

Instances where multiple studies were produced from the same primary data were identified by ES and reviewed on a case-by-case basis with GW or CB. If it was decided that new information had been provided by a study that overlapped with another study, the additional study was be included. However, if the additional study did not offer new information, the most relevant study to answer the review aims was be included and the other was be excluded.

Assessment of reporting biases

The Cochrane Handbook recommends using funnel plots to assess publication bias when there are at least ten different studies.(48) Ten studies were included in this review. However, two of the ten

studies were overlapping publications as defined above. Previous Cochrane reviews have merged overlapping studies when assessing reporting bias – meaning the number of studies eligible for assessment of publication bias using this method was nine.(41) Therefore, the ten-study threshold had not been reached and a funnel plot was not used.

Dealing with missing data

No authors were contacted for additional study information as ethical approval was not sought to access information that could potentially identify participants due to time limitations. Only information that was publicly available will be used. Reasonable gaps in study data were filled in study data where possible. For example, if a study declared that 63% of participants were male, 37% were then recorded as being female.

Combing results and discussion sections

The deviation from convention to combine results and discussion was made because it was felt that much of the data from included studies would be best presented if contextualised by a narrative discussion. However, in the interest of allowing the reader to interpret the results for themselves, the entirely quantitative prevalence data has been presented upfront in tabular form and subsequent data is presented in the first paragraph of each '*perspective*' subsection without any narrative synthesis; resulting in a clear demarcation of data from included studies and narrative synthesis.

In the results and discussion section, four '*perspectives*' are discussed with the intention to identify problem-areas that can be targeted for interventions. These four perspectives offer different focuses: *Individual perspective*, characteristics primarily related to the surgeon themselves; *Group perspective*, direct contacts of a surgeon; *Organisational perspective*, beyond direct contact but related to a surgeon's place of work; *Systemic perspective*, regional-level or national-level issues.

Meta-analysis

It was not possible to perform a meta-analysis to determine the prevalence of burnout in NHS surgeons due to considerable data heterogeneity. The heterogeneity arose from different burnout measurement tools being used and applying different definitions of burnout even when using the same tool. Any attempt to perform a meta-analysis would have likely resulted in a misrepresentation of the evidence.

Results and Discussion

Database results

The MEDLINE and HMIC database searches returned 2796 results seen in Figure 1. Of these, 2687 results were excluded with reasons as they did not meet the eligibility criteria, which can be seen in Appendix 5. Next, 109 full-text articles were reviewed and 10 met all eligibility criteria so were included in qualitative and quantitative syntheses. No meta-analysis was performed due to considerable study heterogeneity.

PRISMA flow diagram

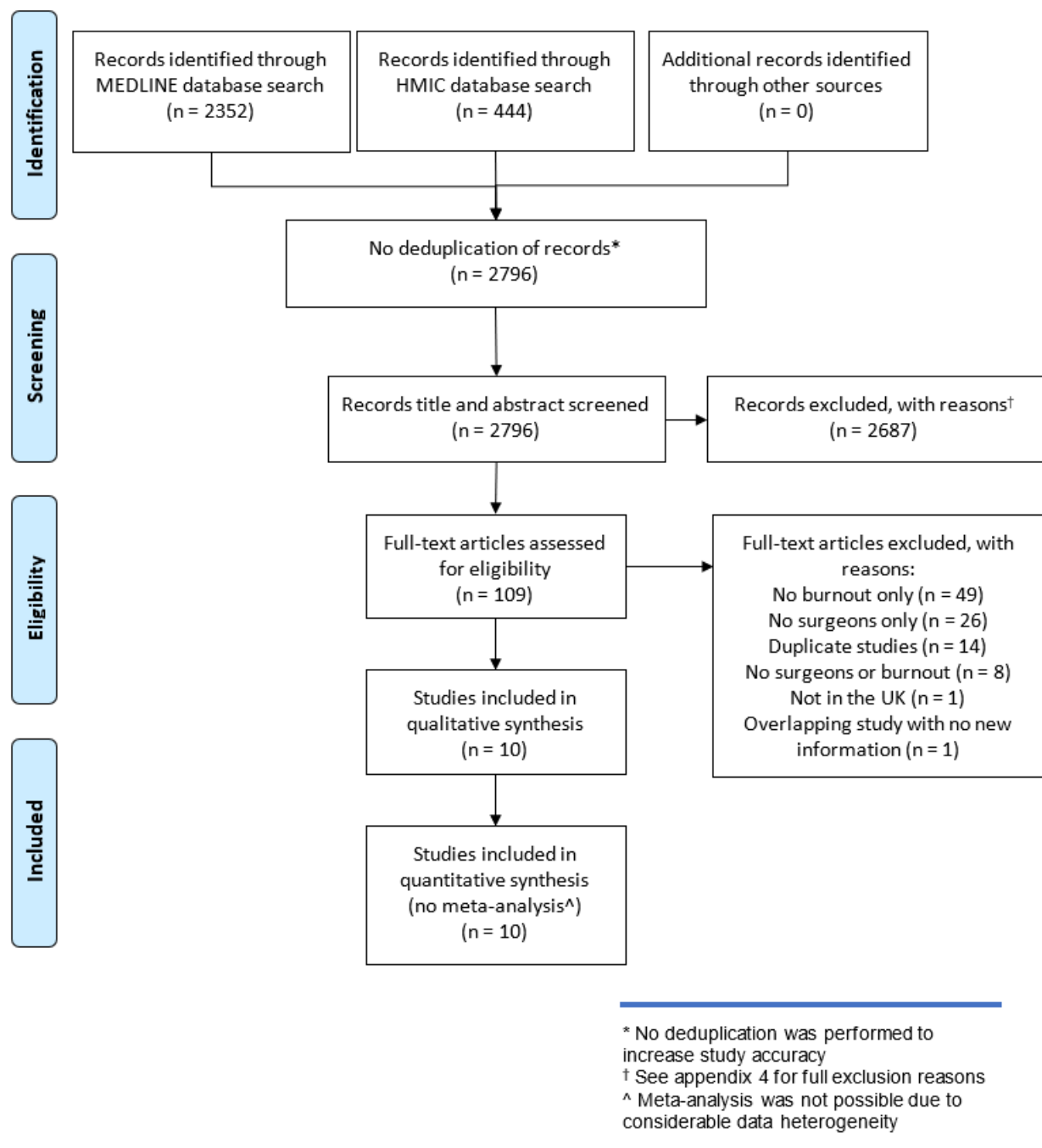


Figure 1 PRISMA flow diagram.(26)

Study characteristics

	Vijendren, 2018 (31)	Khan, 2018 (49)	McCain, 2017 (50)	Walker, 2016 (34)	O'Kelly, 2016 (32)	Upton, 2011 (35)	Sharma, 2007a (51)	Sharma, 2007b (33)	Catt, 2005 (52)	Taylor, 2005 (53)
STUDY DESIGN	Quantitative: self-reported cross-sectional survey	Quantitative: self-reported cross-sectional survey	Mixed methods: self-reported cross-sectional survey	Quantitative: self-reported cross-sectional survey	Quantitative: self-reported cross-sectional survey	Mixed methods: self-reported cross-sectional survey	Quantitative: self-reported cross-sectional survey	Quantitative: self-reported cross-sectional survey	Quantitative - face-to-face cross-sectional survey	Quantitative: self-reported mixed cross-sectional and prospective survey
STUDY PERIOD	Oct - Dec 2014	Nov - Dec 2015	Aug 2016	-	Jul - Dec 2014	-	Apr 2005	Apr 2005	-	2002
STUDY LOCATION	UK-wide via one surgical association database	Hospitals in England, Scotland and Wales	One NHS trust	South East England via surgical training groups	UK-wide (and Ireland) via two surgical association databases	UK-wide via 127 hospital trusts	UK-wide via two surgical association databases	UK-wide via surgical one association database	England, Scotland and Wales	UK-wide via one surgical association database
PARTICIPANTS	121	132	67	104	497	313	501	253	27	115
RESPONSE RATE	121/1344 (9.0%)	-	52.5%*	-	497/1229 (40.4%)	313/1956 (16.0%)	501/853 (58.7%)	253/455 (55.6%)	27/27 (100%)	73%*
AGE DISTRIBUTION	-	30-40 = 20.1% 41-50 = 45.5% 51-60 = 31.0% >60 = 3.9%*	-	Mean = 33.8 CT mean = 28.3 HT mean = 31.7 Consultant mean = 46.5	-	20-29 = 2 (0.6%) 30-39 = 13 (4.2%) 40-49 = 120 (38.3%) 50-59 = 122 (39.0%) 60-69 = 49 (15.7%) Undisclosed = 7 (2.2%)	Mean age = 47.4 (SD 7.4) Range = 31-65	Mean = 47.7 Median = 47 Range = 32-65	-	-
SEX DISTRIBUTION	-	Male = 63.1% Female = 35.1%*	Male = 53.0% Female = 47.0%*	Male = 70 (67.3%) Female = 34 (32.7%)	Male = 87.5% Female = 12.5%*	Male = 282 (90.1%) Female = 24 (7.7%) Undisclosed = 7 (2.2%)	Male = 460 (91.8%) Female = 41 (10.2%)	Male = 227 (89.7%) Female = 14 (11.3%)	-	-
GRADE DISTRIBUTION	SpR = 23 (19%) SAS = 9 (7.4%) Consultant = 89 (73.6%)	Consultant = 132 (100%)	FY2/CT: 9.5% SpR or equivalent = 21.9% Consultant = 44.2%*†	CT = 33 (31.7%) HT = 49 (47.1%) Consultant = 22 (21.2%)	Non-consultant = 21% Consultant = 79%*	SpR = 15 (4.8%) Consultant = 286 (91.4%) Professor = 4 (1.3%)	Consultant = 501 (100%)	Consultant = 253 (100%)	-	Consultants = 159 (100%)
SPECIALITY DISTRIBUTION	ENT = 121 (100%)	10 surgical specialities = 108 (81.8%) O&G = 24 (18.2%)	General = 30 (44.8%) O&G = 12 (17.9%) T&O = 10 (15.0%) Plastics = 8 (11.9%) Urology = 3 (4.5%) maxillofacial = 2 (3.0%) ENT = 2 (3.0%)	ENT = 104 (100%)	Urology = 497 (100%)	9 surgical specialities = 313 (100%)^	Colorectal surgery = 253 (50.5%) Vascular surgery = 248 (49.5%)	Colorectal surgery = 253 (100%)	Breast Colorectal Gynaecological‡	Surgical oncology = 159 (100%)

Table 1 Basic study characteristics and participant information for included studies. **Key** for table is on next page.

Key: * **grouped data which is inclusive of NHS surgeons but not exclusively surgeons, only percentages are given for internal tabular consistency**
‡ does not sum to 100% because FY1s and GPs were excluded
^ 9 specialties because vascular surgery had not separated from general surgery when the study was conducted, meaning vascular surgeons are included under general surgeons
‡ numbers in each speciality were not reported
- information not reported

Common study characteristic issues

As seen in Table 1, study designs were overwhelming quantitative in nature with only two including a qualitative component.(35,50) Christina Maslach, creator of the widely used burnout tool, the Maslach Burnout Inventory (MBI), blames the usability and easy delivery of such quantitative tools for the lack of alternative methodologies in the field of burnout.(9)

Some surgeon data was grouped with non-surgeon data, represented in bold with an asterisk. Surgeon specific information and missing data was impossible to complete without contacting the author(s) directly, but ethical permission had not been granted to do so.

Across most studies reviewed, trainees were underrepresented, and consultants were overrepresented in the sample. In 2014, the Royal College of Surgeons England states that 42.4% of surgeons were consultants.(54) McCain, 2017 and Walker, 2016 reflect this balance.(34,50) However, seven of the studies oversample consultants with three of the seven exclusively sampling consultants.(31–33,35,49,51–53)

There was an overrepresentation of surgical consultants across five of the included studies.(32,33,35,51,55) This meant that women were underrepresented in the samples because in 2014 for example, only 11% of surgical consultants were female despite 30% of surgical trainees being female.(54) Similarly, because of too many consultants were sampled, younger surgeons are underrepresented in four studies.(33,35,49,51)

Two studies have a poor response rate which means the results likely influenced by response bias.(31,35) More worryingly, two studies did not declare the response rate at all.(34,49)

Quality assessment

			Vijendren, 2018 (31)	Khan, 2018 (49)	McCain, 2017 (50)	Walker, 2016 (34)	O'Kelly, 2016 (32)	Upton, 2011 (35)	Sharma, 2007a (51)	Sharma, 2007b (33)	Catt, 2005 (52)	Taylor, 2005 (53)
Introduction	1	Clear aims?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Methods	2	Appropriate study design?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	3	Justified sample size?	no	yes	no	yes	no	no	no	no	no	yes
	4	Clearly defined population?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	5	Appropriate sample population?	yes	yes	no	yes	yes	yes	yes	yes	yes	yes
	6	Process selects representative sample?	yes	yes	yes	no	yes	yes	yes	yes	no	yes
	7	Addresses and categorises non-responders?	no	no	no	no	no	no	no	no	yes	no
	8	Appropriate outcome variables?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	9	Valid instruments to measure outcomes?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	10	Statistical significance clear?	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
	11	Methods described enable to be replicated?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Results	12	Basic data described adequately?	yes	yes	yes	yes	yes	yes	yes	yes	yes	no
	13	Non-response bias concern?	yes	yes	no	no	no	yes	no	no	no	no
	14	Non-responders described?	no	no	yes	no	no	no	no	no	yes	no
	15	Results internally consistent?	yes	yes	yes	no	yes	yes	yes	yes	yes	yes
	16	Results presented for all method analyses?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Discussion	17	Conclusion justified by results?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	18	Limitations discussed?	yes	yes	yes	yes	yes	yes	yes	no	no	no
Other	19	Funding or conflict of interest concern?	no	no	no	no	no	yes	yes	yes	yes	no
	20	Ethical approval or consent obtained?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Table 2 Quality appraisal of studies using the AXIS tool. Full tool in Appendix 4.(45)

	Vijendren, 2018	Khan, 2018	McCain, 2017	Walker, 2016	O'Kelly, 2016	Upton, 2011	Sharma, 2007a	Sharma, 2007b	Catt, 2005	Taylor, 2005
Comments	3: sent to entire surgical college membership 7: not discussed 13: 9.0% response rate 14: not discussed	7: not discussed 13: no response rate given 14: not discussed	3: sent to all medical staff in a trust 5: one trust only 7: not discussed	6: no discussion of selection process 7: no response rate given 13: no response rate given 14: not discussed 15: claim 102 total participants but summing subgroups totals 104	3: sent to all members of two surgical associations 7: not discussed 14: not discussed	3: all surgeons at 127 trusts 7: not discussed 13: 17% response rate 14: not discussed 19: no conflicts of interest or funding statement	3: all members of two surgical associations 7: not discussed 14: not discussed 19: no conflicts of interest or funding statement	3: all members of one surgical association 7: not discussed 14: not discussed 18: not discussed 19: no conflicts of interest or funding statement	3: not discussed 6: not discussed 10: small sample qualitative study 18: not discussed 19: no conflicts of interest or funding statement	7: not discussed 12: unreported characteristics that were described as collected 14: not discussed 18: no limitations discussed

Table 3 Comments addressing where studies deviated from quality appraisal tool. Numbers in boxes correspond to question numbers in Table 2.

All studies retrieved were cross-sectional studies; therefore, only the AXIS tool was used.

Common quality issues

As seen in Tables 2 and 3, the main issue highlighted by the AXIS tool was around non-responders. Nine of the ten studies made no attempt to address or categorise non-responders with only one of the nine studies describing who non-responders may be.(31–35,49–51,53) Seven studies failed to justify the sample size because many authors appeared to use the largest sample size possible.(31–33,35,50–52) Five older studies did not discuss the limitations of the study or failed to declare any sources of funding or the authors' conflicts of interests.(33,35,51,52,56)

Prevalence of burnout in NHS surgeons

	Vijendren, 2018 (31)	Khan, 2018 (49)	McCain, 2017 (50)	Walker, 2016 (34)	O'Kelly, 2016 (32)	Upton, 2011 (35)	Sharma, 2007a (51)	Sharma, 2007b (33)	Catt, 2005 (52)	Taylor, 2005 (53)
BURNOUT TOOL	abbreviated MBI (aMBI)	MBI (EE and DP only)	Professional Quality of Life Scale V (ProQOL V)	Oldenburg burnout inventory	MBI	MBI general survey (MBI-GS)	MBI	MBI	MBI	MBI (EE only)
HIGH BURNOUT DEFINITION	EE + DP > 75th centile	EE≥27, DP≥13	≥57	-	EE≥27, DP≥13, PA≤31	Upper third of scores	EE≥27, DP≥13, PA≤31	EE≥27, DP≥13, PA≤31	EE≥27, DP≥13, PA≤31	EE≥27
MODERATE BURNOUT DEFINITION	-	-	44-56	-	EE 17-26, DP 7- 12, PA 32-38	Middle third of scores	-	-	-	-
LOW BURNOUT DEFINITION	-	EE≤13, DP≤5	≤43	-	EE≤16, DP≤6, PA≥39	Lower third of scores	EE≤16, DP≤6, PA≥39	EE≤16, DP≤6, PA≥39	-	-
OTHER DEFINITIONS	-	-	-	-	High overall burnout = high EE + (high DP or high PA)	-	-	-	-	-
MEAN	aMBI EE = 9.2 aMBI DP = 4.5 aMBI PA = 14.1	-	50.6	33.8	-	-	EE = 21.1 DP = 6.0 PA = 36.9	EE = 21.2 DP = 5.6 PA = 37.3	-	-
STANDARD DEVIATION	aMBI EE = 4.8 aMBI DP = 4.5 aMBI PA = 2.9	-	8.5	6.0	-	-	EE = 11.5 DP = 5.0 PA = 6.6	EE = 11.4 DP = 4.4 PA = 6.4	-	-
HIGH BURNOUT PREVALENCE	28.9%	EE = 42.4% DP = 25.0%	22.6%	-	51.3%*	EX = 33% CY = 32% PE = 6%	EE = 31.7% DP = 21.2% PA = 28.8%	EE = 31.1% DP = 17.4% PA = 26.6%	EE = 22.2% DP = 29.6% PA = 29.6%	1994 EE = 27% 2002 EE = 41%
MODERATE BURNOUT PREVALENCE	-	-	55.6%	-	-	-	-	-	-	-
LOW BURNOUT PREVALENCE	-	EE = 18.2% DP = 50.0%	21.8%	-	-	-	-	EE = 68.9% DP = 92.6% PA = 85.8%	-	-

Table 4 Prevalence of burnout in NHS surgeons. **EE**: emotional exhaustion, **DP**: depersonalisation, **PA**: personal accomplishment, **EX**: exhaustion, **CY**: cynicism, **PE**: professional efficacy. aMBI equivalents to MBI are differentiated in the table as they are scored differently.

Key: * high overall burnout defined under “other definitions”
 - information not reported

Results and discussion perspectives

As outlined in the methods section, the results and discussion sections were merged. The themes identified in the review were separated into four different 'perspectives': *individual*, *group*, *organisational* and *systemic*. In addition to the perspectives, interventions were identified which spanned across all perspectives. These perspectives and interventions are mapped out in Figure 2.

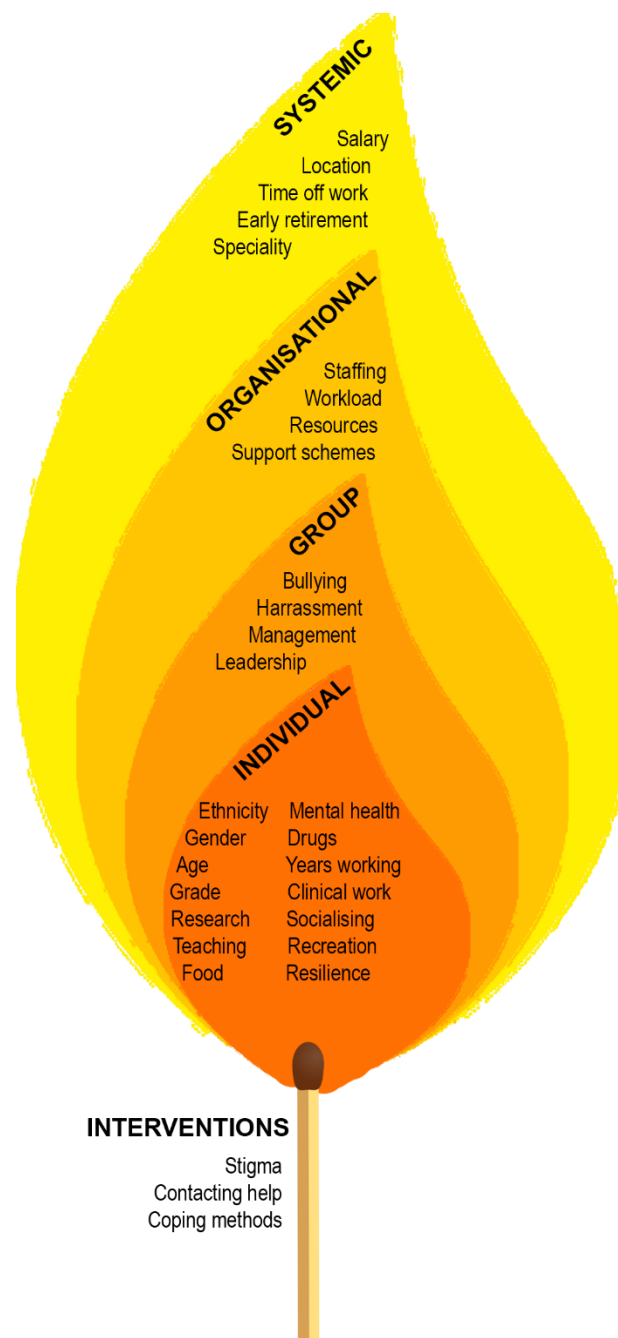


Figure 2 Thematic map for different perspectives and interventions discussed in merged results and discussion section.

Individual perspective

Ethnicity

One study evaluated the role of ethnicity on having burnout. This study suggested there is no relationship between a surgeon's ethnicity and having burnout (n=575, p=0.31).(32)

However, no information on the ethnicity categories used was given and no breakdown of the number of participants in each category was given. It is unlikely this study had sufficient power to evaluate the relationship between ethnicity and burnout since most participants were likely to be white or Asian. The March 2018 NHS Workforce Statistics state that white and Asian doctors account for average 56.6% and 29.0% respectively with all other groups accounting for 14.4%.(57) Under-sampling means that a relationship between burnout and ethnicity in the smaller ethnic groups was unlikely to be statistically significant even if the rate of burnout was higher.

Whilst O'Kelly 2016 suggests ethnicity does not relate to burnout, the British Medical Association (BMA) stated in 2018 that black and minority ethnic (BME) doctors were twice as likely to be discriminated against whilst at work from both colleagues and patients.(58) This may mean BME doctors are more likely to experience hostile behaviour such as be bullying or harassment and these doctors will likely try to cognitively distance themselves from their work to cope and will feel more negative overall about their work. Cognitive distance and negativity about work are two core features of burnout in the ICD-11 definition which suggests there may be a relationship between ethnicity and burnout.(13)

Gender

Results from five studies evaluate the relationship between a surgeon's gender and burnout. All studies suggest there is no relationship between the two.(32,34,35,49,50)

Surgery has one of the largest gender divides of all specialties which can be seen in Figure 3 below; however, this divide is shrinking. A large and historic gender divide may mean that women in surgery

face problems that men do not. Also, some surgeons may be gender-blind, where someone disregards gender as a significant factor in the workplace, due to mainly working with men.

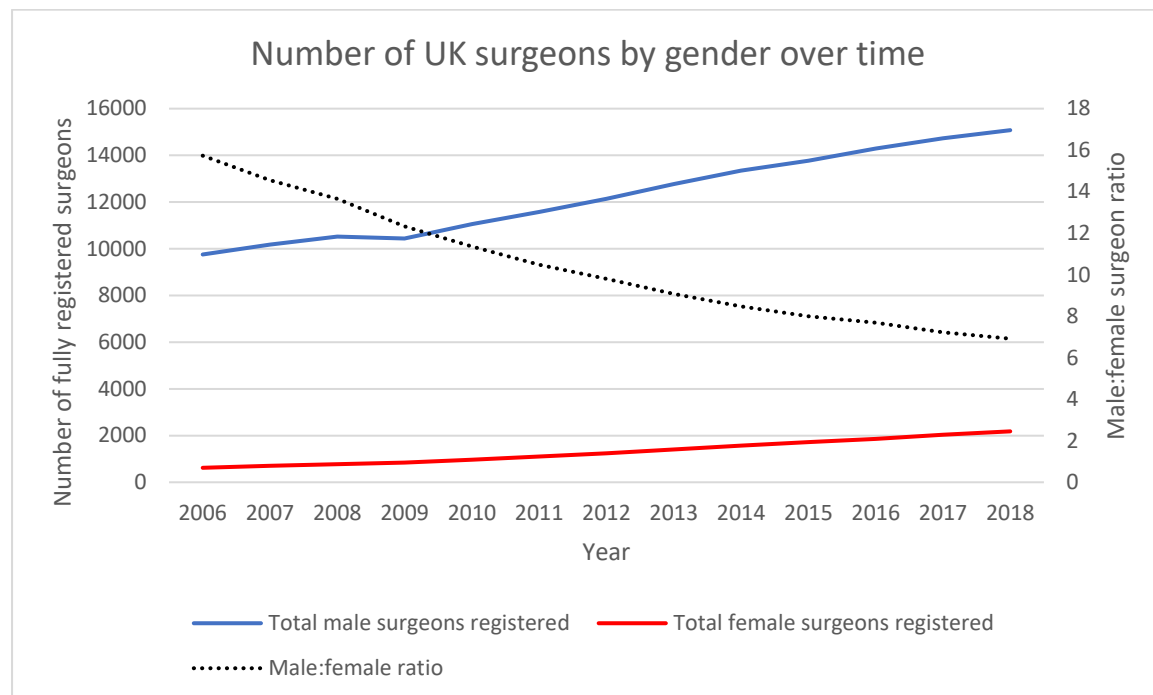


Figure 3 Number of surgeons by gender fully registered with the GMC over time.(59)

In the USA, which has a different healthcare structure to the UK, female surgeons are 1.41 times more likely to have burnout than men.(60) Further studies of female surgeons in the USA and Australasia have found that women who do not have role models or mentors are likely to burnout or leave the profession.(61,62) A possible contributory factor for why women are equally as likely to have burnout as men in the NHS is the introduction of visible female role models such as a previous female president of the Royal College of Surgeons, England, Dame Clare Marx and programmes such as the Women in Surgery Forum which highlights successful female surgical role models.(63) Despite visible female surgical role models, medical students often report difficulty identifying any which casts doubts on this theory.(64) Further work must be done to identify why female surgeons in the UK are as equally likely to have burnout as male surgeons.

Some female surgeons in Australasia have felt gender related issues such as, the impact of pregnancy, childbirth and raising a child on them were under-recognised at both an individual-level

and national policy-level which caused them to leave surgery as a career.(61) Some of the women left surgery because they were not placed in a hospital near their family and did not receive any support from the hospital management during pregnancy.

It is reasonable to assume that some female surgeons in the NHS experience similar issues. Less than full time (LTFT) work offers a solution to surgeons of both genders who want to raise a child. In 2015, 63.4% of surgeons working LTFT were female and 87.6% of women chose to work LTFT because they wanted more time to raise their child. Despite LTFT work being an official form of surgical training, over half of trainees felt they experienced undermining behaviour because of their choice to work LTFT.(65) Undermining and unsupportive behaviour from colleagues, such as the behaviour against those who work LTFT in surgery, is a contributor to burnout that affects women more than men but is not recognised in the results of the five studies.(66)

Age

The results of four studies suggest that increased age is associated with less burnout.(32,33,49,51)

One study suggests there is no relationship between age and burnout.(35)

However, across all five of these studies, consultants were over-represented. Sharma, 2007a, Sharma 2007b and Khan 2018 only sampled consultants and in Upton, 2011 and O'Kelly, 2016, 91% and 79% of participants were consultants respectively. The over-representation of consultants makes it difficult to reach a robust conclusion about the relationship between age and burnout.

A potentially confounding factor between the relationship of age and burnout is that people who are more likely to have burnout may leave surgery at a younger age, meaning older surgeons suffer from less burnout because everyone who had burnout when they were younger has left. This is possible as a systematic review found the attrition rate of general surgical trainees internationally to be 18%.(67)

Surgical grade

Four studies suggest there is no relationship between surgical grade and burnout.(31,34,35,50) One study suggests that consultants are at higher risk of burnout than non-consultants.(32) In these studies, consultants were also over-represented compared to trainees.

Someone who perceives they have less autonomy when making decisions at work is more likely to burnout.(66) Despite this, one study's results suggest consultant surgeons who hold more decision-making authority are equally, if not more likely to burnout than non-consultant surgeons.(32) It is possible that the impact of personal autonomy is masked by other confounding factors such as unsupportive colleagues or excessive workload.

Years in position, speciality or working

One study suggests more years of work experience is associated with higher emotional exhaustion (EE) and depersonalisation (DP).(49) One study suggests more years in a speciality is associated with less exhaustion (EX).(35) Three studies suggest there is no correlation between the years in a position, speciality or working and burnout.(31,35,56)

Someone who has spent more years in a position or speciality is likely to have more realistic expectations of the nature of their work which could reduce burnout.

If someone chooses to stay in a position for many years, it is easy to think that the person may be enjoying the role and experiencing less burnout than someone who quickly leaves. However, making a choice to stay somewhere for years does not mean the work is not contributing to having burnout. For example, in addition to universal prohibitors of workforce mobility, such as the location of a child's school, surgical trainees may be unable to leave a position without detrimental implications on their training pathway like having to re-enter a national job application process. These workforce immobility factors make it difficult to establish a relationship between years spent in a role and burnout.

Satisfaction and expectations of work

Two studies suggest that decreased job satisfaction is associated with having burnout.(51,56)

A probable explanation for this observation is that surgeons who experience a mismatch between their expectations and the reality of modern surgical work feel more dissatisfied with their work and are also more likely to burnout. For example, surgeons internationally feel they have a strong cultural identity that centres around the surgeon's mastery of an 'art' that is performed in 'theatre'.(16) A 2014 review suggested that some surgeons may failed to incorporate the less glamorous reality of their work with this cultural identity, such as having a high administrative burden.(16) Therefore, it is unsurprising that another study found the largest self-perceived work stressor for surgeons is their high administrative workload.(32)

The mismatch between expectations and reality must originate somewhere and it seems disingenuous to shift the blame entirely to the surgeons themselves. Expectations of surgery begin to form during medical school, if not earlier, and solidify through postgraduate training.(64) It is likely that as the job demands of a modern surgeon rapidly diversified, medical education has failed to adequately match surgical trainees' expectations to those new responsibilities. It is the mismatch between the reality and expectations of a surgeon's work that is likely responsible for decreasing satisfaction with work and increasing burnout.

Clinical work, patients, teaching and research

Two studies suggest the complexity of clinical work and managing patient expectations, particularly when dealing with patient's distressed relatives, are moderate stressors at work.(32,56)

Alternatively, two studies suggest surgeons love their clinical work involving patients, operations, out-patients clinics, teaching and audit and contributes little towards burnout.(32,35) One of these studies shows that holding a research role is associated with less burnout.(32)

Surgeons most likely enjoyed their clinical work because that is what they train for and expect to be doing, sharing a similar theme with why surgeons are satisfied with their work.(16)

Surprisingly, the experience of performing operations, where an ill-placed slip of the knife could kill someone, which a lay person may find stressful, surgeons did not find stressful at all.(32) This is likely to be explained by three reasons. Firstly, a surgeon has learned the relative risks of an operation after years of training. Secondly, most of the actions performed during an operation originate from their procedural memory (or “muscle memory”) so little active thinking is involved.(68) Finally, the surgeon has high personal autonomy and control during an operation which is known to be protective against burnout.(66)

Socialising and recreation

Two studies explored the relationship between social and recreational activities and burnout. Living alone, keeping things to oneself, taking things out on one’s family, not relaxing, spending less time with friends and spending less time doing sport and exercise were all associated with having burnout.(33,51)

These two studies highlight that when work consumes a surgeon’s life, the surgeon is more likely to have burnout. What may reduce burnout is to focus on being a ‘well-rounded’ person instead of using coping activities in isolation and to avoid work becoming the only thing a person does. For example, a 2018 review found the impact of exercise alone on preventing burnout in physicians is unclear.(69) This in contrast to another study in medical students which found that using a combination of strategies, such as doing sports and seeking support from friends, was associated with less burnout.(70) This evidence suggests that when suffering from burnout, paradoxically, it may be better to do more thought-occupying activities, such as sport, rather than mindless activities to focus on the tasks at hand and avoid focusing on previous or future work stressors. Additionally, by discussing their problems with other surgeons during social occasions, surgeons were often relieved to realise their emotions on burnout are usually shared.(71,72)

Resilience and grit

One study found that more 'gritty' surgeons were less likely to have burnout.(34)

Resilience is defined by the American Psychological Association as a set of learned behaviours, thoughts and actions that create a process of successful adaptation to significant sources of stress.(73) Grit is defined by the creators of the Short Grit Scale as a passion and perseverance for long-term aims.(74) Both resilience and grit assess someone's ability to keep working when facing adversity or stress and unsurprisingly, both are associated with having less burnout.(34,50)

Resilience has become buzzword amongst organisations as resilience training is increasingly offered to protect against burnout. However, David Oliver at the British Medical Journal (BMJ) argues that resilience has become a "dirty word" as it shifts blame to the individual rather than focusing on the poorly organised systems that create the burnout.(75) He is right to suggest that inefficient work environments and process can contribute to burnout, but after his article was written in 2017, a 2018 systematic review has shown that structured resilience training can strengthen individual resilience.(66,76) Despite its efficacy, resilience training alone should not be used to tackle burnout as it may result in a surgeon's poor resilience becoming a scapegoat without tackling an underlying occupational cause of having burnout. The main utility of resilience training appears to be its ability to help some surgeons 'bounce back' after acute stressors that ordinarily would have contributed to having burnout.(76)

Food, medication, drugs, alcohol and smoking

Three studies explored the relationship between food, medication, drugs, alcohol and smoking with burnout. Surgeons with high emotional exhaustion (EE) ate less food and those with high depersonalisation (DP) ate more food.(51) Surgeons with high EE were more likely to take sleeping tablets and those with low personal accomplishment (PA) were more likely to "take tablets for nerves".(33,51) People with burnout were more likely to use a "substance abuse coping strategy" to manage their burnout.(50) Surgeons with high EE were also more likely to smoke cigarettes.(33)

A 2019 study focussing specifically on alcohol use and binge-eating in UK doctors confirmed the findings of the studies in this review. As seen in Figure 4, the authors note that across all types of doctor, 44% binge-drank with 5% meeting the alcohol dependence criteria and up to 29% of doctors had negative emotions when overeating with 8% meeting binge-eating disorder criteria.(77)

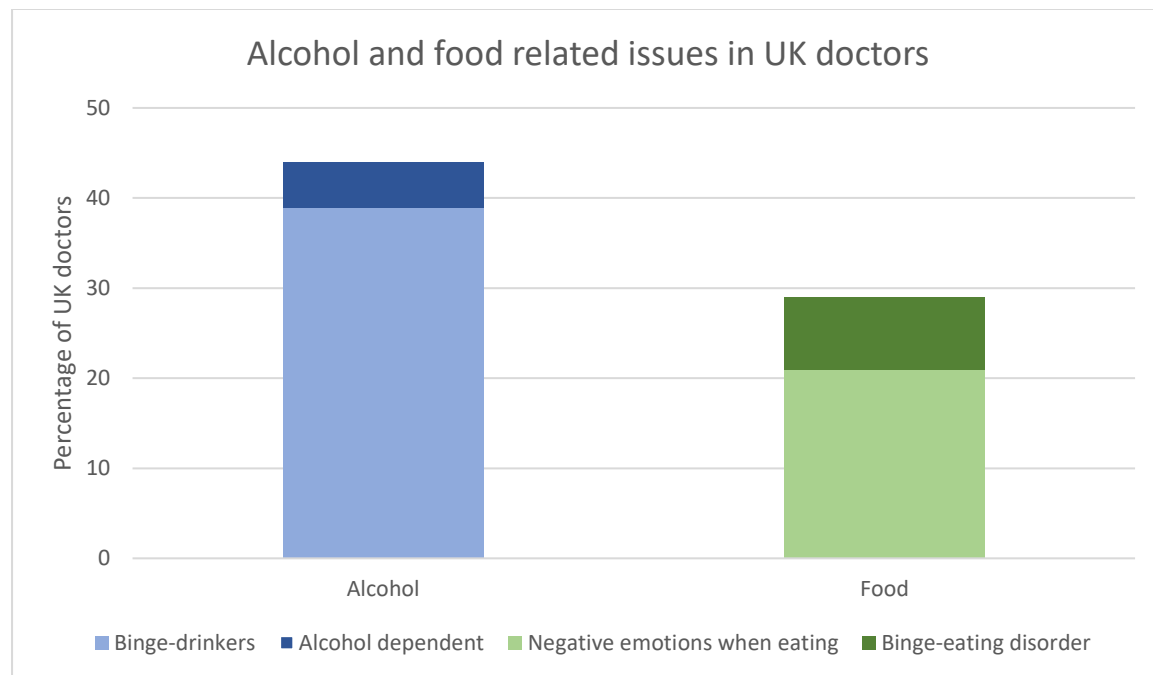


Figure 4 Percentage of UK doctors suffering from alcohol and food related issues.(77)

Substance abuse and long-term medication for burnout is an unsustainable coping strategy for burnout with negative effects on an individual's health. The illegality of acquiring or possessing non-prescription drugs raises unique concerns because, if a doctor is cautioned by the police or found guilty of a criminal offence, it must be reported to the General Medical Council (GMC) immediately which could result in suspension or termination of that doctor's license to practice.(78)

Other mental health concerns

Three studies considered other mental health issues alongside burnout. High emotional exhaustion (EE) and depersonalisation (DP) correlated with increased frequency of both depressive and anxiety symptoms.(49) Surgeons with burnout had reduced compassion satisfaction and increased secondary traumatic stress.(50) High exhaustion (EX), high cynicism (CY) and low professional

efficacy (PE) were all associated with high levels of total mood disturbance, a combined measure of anxiety, depression, anger, vigour, fatigue and confusion.(35)

Some authors believe that the apparent link between burnout and depression exists because burnout could more appropriately be categorised as a subtype of depression.(8) However, Ayala Pines argues that depression remains as distinct condition as depression is all-pervasive whereas burnout is only present at a person's place of work.(9) Pines' assumption on the singularity of burnout is reflected in the ICD-11 classification of burnout as a separate condition.(13)

Although not discussed in any study in the review, recent high profile cases of physician suicide have cast a spotlight on the role that burnout played in their deaths.(79) However, as the incidence of burnout has increased, the incidence of physician suicide has remained relatively stable.(80) There is an absence of evidence suggesting a causal link between burnout and suicide. So, the effect of burnout, if any, remains unclear.

Group perspective

Harassment and bullying

One study provided qualitative evidence that harassment in the workplace contributed to burnout.(35)

As discussed in the earlier *ethnicity* and *gender* subsections, undermining or unsupportive behaviour can negatively impact an individual's sense belonging in a team and reduce their ability to care for patients.(58) A Danish study in 2019 confirmed this after it found that bullied younger surgeons were at increased risk of developing burnout.(81) Both of these findings align with the theoretical understanding of the process of developing burnout. When there is the absence of a supportive team due to bullying, the individual will be socially isolated and then become emotionally disconnected from their work to cope.(9) At the point of emotional disconnection is when the individual can said to be suffering from burnout according to Cherniss' definition of burnout in the *defining burnout* section.(5)

Management and leadership

Six studies consider the role of leaders and managers in developing burnout. In two studies, qualitative evidence suggests that bad hospital managers contributed to surgeon's burnout.(35,53) Surgeons in another study felt "management support" was a major stressor but "senior clinician support" was a minor stressor.(32) People who held a leadership or management role were more likely to have burnout than those who did not.(32,52) People who felt they had been adequately trained in management skills and communication skills were less likely to suffer from burnout.(33,51)

The quality of evidence from the included studies that suggests bad leadership causes burnout is relatively poor. However, evidence from a study of 2,684 physicians in the USA found that when a departmental leader was rated as having weak leadership qualities by the other staff in the

department, the staff in that department were more likely to suffer from burnout.(82) Although this study only represents one healthcare organisation, it highlights universal challenges. It is not necessarily the fault of poor medical leaders for being poor leaders. In some organisations, clinical leaders are selected based on scientific expertise or reputation rather than their leadership skills.(83) The highly sequential UK postgraduate medical training pathway means consultancy, or becoming a team leader, is viewed by many as the only career progression option even if these individuals do not feel sufficiently competent in leadership skills.(84) This is reflected in the included studies as many in leadership positions feel they have substandard management and communication skills.(33,51) Efficacious strategies must be developed to identify, select and train effective clinical leaders to fight burnout whilst developing attractive alternative career pathways for those who do not want to be a leader.

The included studies also suggest leaders are more likely to have burnout.(32,52) Leaders have greater personal autonomy because of their increased decision-making power, which is known to protect against burnout.(66) For example, a study has shown that improving personal autonomy of staff through laissez-faire and transformational leadership styles results in less staff burnout than other leadership styles.(85) This study means it more surprising that leaders in the included studies, who have high personal autonomy, burnout more.

Some authors have suggested burnout occurs in leaders because of poor role clarity resulting in poor leadership.(86) However, it has been demonstrated that being a poor leader does not relate to the likelihood of that leader having burnout.(82) Instead, what is more likely is that burnout in leaders is a process influenced by many inter-related factors rather than one dominant factor, such as personal autonomy. What remains clear is that without adequate support, leaders can also have burnout.

Organisational perspective

Resources and staffing

Two studies commented on resources and staffing. One suggested that “lack of institutional resources” was a major stressor that contributed to burnout.(32) The other offered anecdotal evidence that “feeling poorly [...] resourced” contributed to burnout.(56)

Understaffing is a major issue in the NHS with many departments chronically understaffed.(87)

Despite working in understaffed departments, nurses with high levels of emotional exhaustion (EE) paradoxically saw less patients.(88) Observations of understaffing contributing to burnout align with the current burnout theory. Healthcare staff such as surgeons and nurses tend to enter their professions to help people. When they feel unable to help patients to the level required because of understaffing, they feel like they have failed, feel guilty, cognitively withdraw and work less effectively.(9)

As can be seen in Figure 5, the number of vacancies relative to working surgeons between 2015-2018 remained relatively stable with a small decrease suggesting surgical departments have become better staffed. However, Figure 5 excludes the number of vacancies in other ancillary professions which may have increased and could prevent a surgeon from being able to deliver holistic and high-quality patient care.

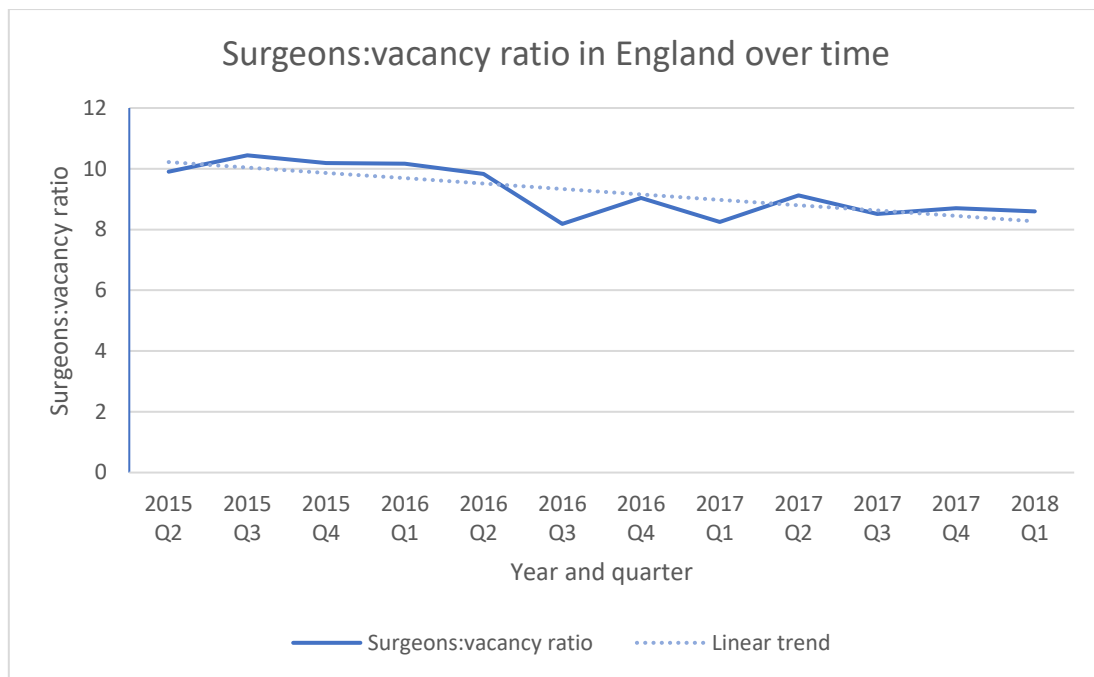


Figure 5 Number of actively working surgeons per surgical vacancy in England as advertised by Health Education England (HEE). (89,90)

Workload

Four studies considered the role of workload in burnout. One study found no correlation between number of hours worked and likelihood of having burnout.(35) Two studies suggested that high emotional exhaustion (EE) and depersonalisation (DP) are associated with high perceived work stress.(49,56) One study suggested the most stressful part of a surgeons work was the administrative workload but the overall work volume was a smaller stressor.(32)

Following the introduction of the European Working Time Directive (EWTd) in 2009, which limited working to 48 hours per week, there was a 43% increase in shift work or partial-shift work for some surgeons to provide adequate staffing cover – theoretically reducing burnout.(91,92) However, the empirical evidence shows that working less hours does not reduce burnout.

Instead what happened was surgeons were scheduled to work less hours but due to chronic understaffing, surgeons had more work to do in less time which resulted in overall workload becoming a major stressor and frequent breaches of the maximum EWTd cap.(32) The increased workload likely resulted in surgeons being able to deliver a lower level of care than they felt

acceptable which resulted in reduced personal accomplishment and contributed to burnout.(88) The shift work also resulted in surgeons frequently working with different people which probably weakened their supportive team structure and decreased the protective effects against burnout that a supportive team conveys.(93)

It is unsurprising that administrative workload was found to be the single biggest stressor for surgeons because medical training fails to adequately prepare trainees the administrative burden of a modern surgical career.(16,32) The mismatch between surgeons' career expectations and reality can result in a surgeon feeling like they are not using their professional skills to help people but instead, wasting their time on administrative tasks.(9)

Support schemes

One study provided qualitative evidence to suggest a lack of support for new consultants contributed to burnout.(35)

Many interrelated themes arise from this observation. The surgeon may feel inadequately trained to move into a leadership role as discussed in the *management and leadership* section or may feel they do not have supportive team to seek advice from as discussed in the *workload* section.

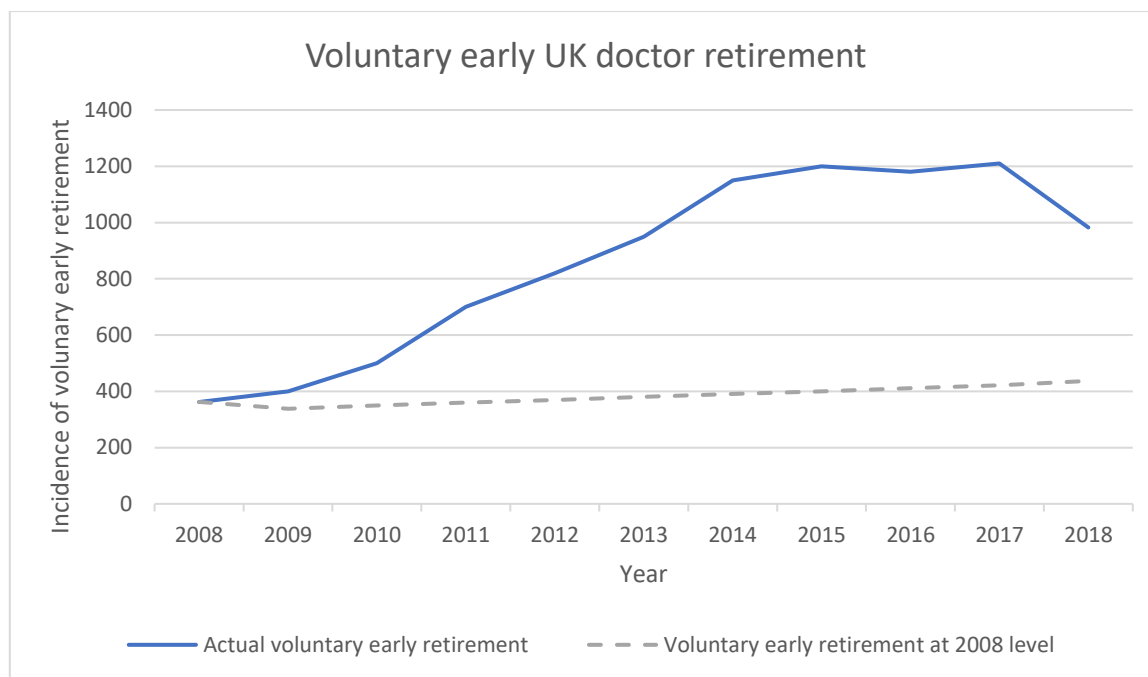
Alternatively, adequate formal support schemes for new consultants may exist but the surgeon may not know where to look for that support. However, in the context of mentorship as a method for new consultant support, formalised schemes often fail. Instead, informal and naturally occurring relationships that happen in an organisation with a background of encouraging these relationships is more likely to successfully support new consultants. It is not correct to push the blame entirely on the individual for not knowing about or using formal support schemes. Instead, a more helpful approach is to recognise that both parties play a role whereby the individual must be willing to seek out support that works for them in an organisation where supporting one another is normal.

Systemic perspective

Time off work and early retirement

Five studies explored surgeons taking time off work or wanting to retire early.(32,33,35,49,51) In one study, 7.3% of surgeons sampled said they had taken time off work because of burnout.(32) In other studies, high EE and low PA both correlated with those who wish to retire early; however, DP did not correlate.(33,35,49,51)

A unifying limitation of the included studies is that they measure intentions to retire early, but not those who actually retire early. In 2019, the BMJ found that between 2007-08 and 2018-19, the number of hospital doctors who voluntarily retired early rose by over 172% (362 to 983 retirees) despite there only being a 22% increase in the number of UK doctors over the same period of time, which can be seen in Figure 6 below.(59,94,95) Although the rise in the number of doctors voluntarily retiring early is significant, the number of all early retirees combined only accounts for 0.3% of the current medical register which brings into question if early retirement is a substantial problem.



*Figure 6 Incidence of voluntary early retirement for UK doctors across time. **Blue line:** actual incidence. **Grey-dashed line:** rate at 2008 level, assuming the number of people who retire in subsequent years is directly proportional to the size of medical register.(59,94)*

In one Canadian study of physicians, the authors use evidence from the Canadian National Physician Survey to suggest that only 1.5% to 19.9% of surgeons who have burnout between 45-54 years old will retire before the national age of 65. As expected, this number is considerably lower than those who state their intentions to retire early but considerably higher than the early voluntary retirement rates of doctors in the UK.(96)

Reduced clinical hours and leaving the practice altogether due to burnout have significant supply-side implications at the strategic level both organisationally and nationally. In the USA, a 2019 study estimated that burnout causes an 18.5% reduction in the number of clinical hours that surgeons worked. The authors estimated the financial cost related to burnout from reduced working hours and leaving practice altogether due to burnout to be approximately \$7,600 per surgeon per year.(97) Although the cost of employing a surgeon is significantly different in the USA to the UK, the lesson to be learned is still the same – burnout has significant and negative financial implications.

Income and salary

One study suggested that both salary and pension concerns were moderate stressors for contributing to burnout.(32)

A study in the USA found that in higher earning specialties, burnout was less prevalent. However, when burnout did occur, it was more severe according to the burnout tools used.(18)

The authors suggest that instead of salary being a mediating factor to prevent the development of burnout, burnout rates being low in a speciality, combined with a high salary, increase the likelihood of all positions in that speciality to be filled.(18) This assumption suggests that the apparent correlation between high salary and burnout exists because these are both desirable job characteristics rather than any causal relationship existing between the two.

This assumption is likely to be true as in the USA, expected physician salaries are known to be a determining factor when choosing a speciality and it is also possible that burnout prevalence within that speciality plays a role.(98)

No study like the one in the USA has been performed in the UK probably because physicians' salaries do not vary considerably by speciality since the NHS acts as a monopolistic employer. By extending the results of the American study, it is reasonable to conclude that in the absence of salary being a deterministic factor for speciality choice, UK medical trainees are likely to place an increased value on the lifestyle factors of specialities. This would result in increased competition for the specialties with lower incidence of burnout and other related factors; although, this relationship is not currently backed by empirical evidence and remains theoretical.

Burnout between specialities

Five studies considered the relationship between burnout and surgical specialty. Four studies found no relationship between surgical specialty and likelihood of developing burnout.(31,35,49,51) One

study found surgeons were less likely to develop burnout than non-surgeons.(50) One study found that levels of depersonalisation were significantly higher in surgery than non-surgical specialities.(49)

Overall, the evidence suggests that surgical specialty does not play a significant role in the likelihood of developing burnout.(31,35,49,51) These results align with the current theory that burnout is an occupational condition which is most strongly influenced by organisational factors.(66) This is because all surgical specialties in one hospital work for the same organisation and are likely to experience similar stressor. When compared nationally, the hospitals broadly share the same structure and experience surgeons experience similar issues.

Further evidence to support the assumption that those working in hospitals experience similar stressors arises when comparing hospitalists to general practitioners (GPs). GPs have a different organisational structure than hospitalists because each GP practice is run by partners, rather than an executive board. It is because of different organisational structures and the large impact of organisational factors on developing burnout that subtle inter-speciality differences may have been masked in the study which concluded non-surgeons have higher rates of burnout than surgeons by including GPs in the comparator group.(50)

Another possibility to explore is that the patient workload of a speciality may make it more likely that those specialists develop burnout. For example, depersonalisation could be used by surgeons as a protective tool when working with patients who have terminal illnesses such as cancer. However, when comparing between surgeons who had different cancer workloads, defined as the percentage of their patients who have cancer, depersonalisation and overall burnout rates were unrelated to cancer workload.(51) The observation that depersonalisation was not used as a protective tool by the surgeon when managing emotionally challenging cancer patients raises doubt about the efficacy of depersonalisation for emotional protection.

Work location

Two studies considered the relationship being work location and burnout. One study found no association between EE or DP and working in England or Wales.(49) The other study, whose results can be seen in Figure 7 below found those working in England to have an increased risk of burnout but no relationship for those working in Scotland, Wales or Northern Ireland.(32)

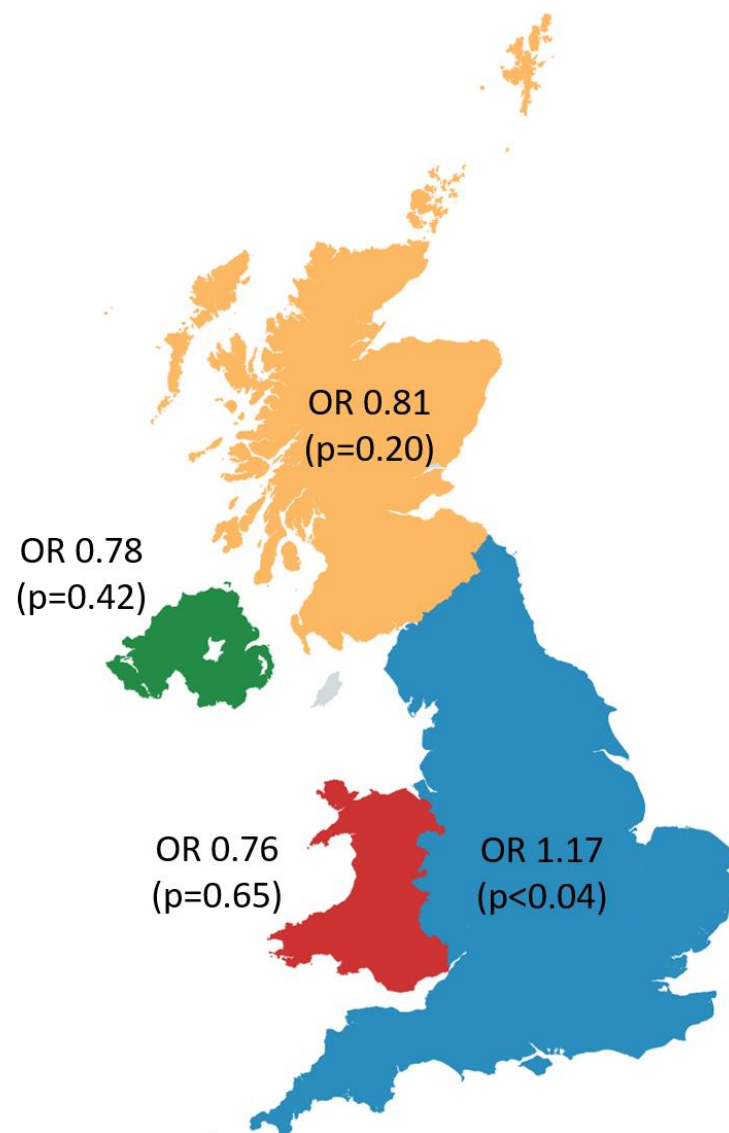


Figure 7 Odds ratios (OR) for developing burnout amongst urologists in England (blue), Scotland (orange), Wales (red) and Northern Ireland (Green).(32)

Geographical instability, the uncertainty around where someone lives and works, can weaken some factors which protect against burnout, such as living close to a social support network like friends and family.

In 2005, the Modernising Medical Careers (MMC) Programme was launched which brought with it national-level job applications for postgraduate medical and surgical training which threatened to increase geographical instability.⁽⁹⁹⁾ The programme also promised to improve trainees' knowledge and experiences by exposing them to a variety of healthcare settings throughout the UK. Whilst some in the Health Select Committee in 2008 argued these goals had been achieved, more recently in 2018, evidence suggests that MMC caused more geographical instability as 93% of surgical trainees said that UK surgical training had made it harder to settle in a permanent home.^(100,101)

MMC increased geographical instability in 93% of surgical trainees which can weaken protective factors against burnout. This means there may be a relationship between, for example, frequency of moving to a new house or distance from familial or social home that is not revealed by the included studies. It is likely the observations in the included studies find there to be generally no burnout difference between regions as all surgical trainees experience a similar increased risk of developing burnout because of their similar geographical instability rather than being caused by the region they currently live and work in.

Reducing burnout and coping behaviours

Burnout stigma and contacting help

One study found that 59.9% of surgeons would consider discussing burnout with a colleague, 79.7% believed all surgeons should be evaluated for burnout but only 59.7% said they would use workplace counselling for burnout if offered.(32) Despite this, only 8.2% had sought professional help for burnout. The authors also found that surgeons who had high levels of emotional exhaustion were less likely to have spoken to a professional about burnout. Another study offered qualitative evidence to suggest surgeons do not talk about burnout because they fear of being seen as weak and becoming stigmatised.(35)

Perceptions of weakness are pertinent in surgery as a systematic review found surgeons to view their profession as one of “champions and winners” who are “able to cope with anything”.(16) The reality is no one can cope with everything and behaving like that is possible is likely to harm mental health in the long-term. By correcting the harmful perception that surgeons can cope with anything will likely increase the number who are willing to discuss burnout with colleagues.

An alternative explanation why some did not feel comfortable discussing burnout with colleagues is because burnout is an occupational condition, implying some surgeons may not want to talk about this condition with difficult colleagues who may be the cause of their burnout.

Although 79.7% said surgeons should be evaluated for burnout, only 59.7% said they would use counselling if available.(32) The 20% discrepancy between the results implies there is a group who feel screening is necessary but are not prepared to receive counselling if offered. The reason why surgeons decline counselling is not addressed but is likely multifactorial such as not wanting to seem weak and questioning the efficacy of counselling. Understanding the reasons why some surgeons may decline burnout counselling and why others seek professional help are both areas that require further exploration.

Coping behaviours and interventions

This section excludes coping behaviours addressed in the earlier section; *food, medication, drugs, alcohol and smoking*. One study found no relationship between burnout and two coping behaviours: “venting about burnout” or “coping by denial”.⁽⁵⁰⁾ The same study found two coping behaviours were associated with increased burnout rates: “self-blaming” and becoming behaviourally disengaged from their work.

Venting, denial, self-blame and behavioural disengagement were recorded by participant self-rating who likely used variety of definitions and criteria for these concepts.⁽⁵⁰⁾ For example, the authors do not clarify if using the denial coping strategy meant the individual was denying that they suffer from burnout or denying that burnout is a problem or both. Unaccounted for assumptions such as these reduces the validity of these observations.

An interventional study with strict application of a coping behaviour would have resulted in a more valid conclusion. Unfortunately, all included studies were observational. A 2016 systematic review suggests that it is possible to reduce burnout through both individually and organisationally targeted interventions with both methods offering similar results and no intervention in particular producing better results than others.⁽¹⁰²⁾

The current best evidence suggests that it is possible to reduce burnout rates through a variety of approaches.⁽¹⁰²⁾ However, there is a limited understanding of the optimal intervention or combination of interventions for reducing the burnout rates. The efficacy of these interventions becomes more unclear when long-term benefits are considered and if re-interventions are necessary to sustain the short-term reductions.

Limitations

This systematic review is subject to numerous limitations which can be most appropriately categorised into methodological limitations and results limitations.

Methodological limitations

The most significant limitation of this review was that only one person conducted most of the study as it was undertaken as part of a Master's degree. Best practice suggests that at least two people but optimally three should: screen the studies for inclusion, critically appraise the studies and conduct data extraction.⁽³⁶⁾ Only one person performing these tasks is an issue because that person may introduce considerable bias or unintentional human error into a process that is meant to be as objective as possible. To mitigate the impact whilst still conforming to the degree requirements, external help was frequently contacted in the form of dissertation supervisors.

During the screening process, author details were not blinded to the reviewer which may have influenced which studies were included. However, the impact of this is likely to be small relative to the impact of only one reviewer screening the results with guidance from supervisors.

A choice was made to qualitatively analyse published results that grouped NHS surgeons in with other clinical NHS staff. This decision was made because a relatively small pool of eligible studies existed, and clinical NHS were deemed to be sufficiently similar enough to NHS surgeons. The result of this is that some outcomes from the qualitative component may have been inappropriately generalised to NHS surgeons. Best practice suggests that additional data be requested from the corresponding authors in this situation, but additional data was not requested as ethical permission for this purpose was not sought due to the time limitations of the master's degree.⁽³⁶⁾

Since this dissertation took considerable time to write and searches were performed in March 2019, new studies may have been published that were not included.

This review is particularly susceptible to the 'wishful thinking' cognitive bias because the review was conducted as part of a Master's degree with a hard deadline for results to be produced. Wishful thinking occurs when someone believes something is true because they want it to be true.(103) To mitigate this, academic supervisors regularly reviewed the project.

Results limitations

Due to considerable study heterogeneity when reporting burnout prevalence by using different tools and definitions of burnout, it was not possible to perform a meta-analysis. This meant the primary aim of, establishing the prevalence of burnout in surgeons in the NHS in the UK between 2000 and 2018, could not be addressed fully.

The other main weakness of the results was the homogeneity of study designs to explore this multifactorial issue. All studies included were cross-sectional despite all study designs being eligible for inclusion. All studies measured from a single point in time which means they are unable to determine causal links but only correlations and differences. Only one study did not use self-reported and therefore subjective data to draw conclusions.(52) Self-reported data has several considerable weaknesses such as exaggerated answers or the participant guessing the aim of the study and answering to prove or disprove the study aim.(104) Common-method variance may have also resulted in some outcomes from the included studies being artefactual rather than real.(105)

Three studies have low response rates which is a weakness because the outcomes of these studies are likely subject to considerable selection bias.(31,35,49) For example, only those who felt they had burnout may have responded because they wanted to highlight it as an issue. Alternatively, more people without burnout may have responded since those with burnout may have become more isolated. With low response rates, it is difficult to draw valid conclusions. Almost all studies fail to address or categorise non-responders which is a problem because the authors increase the risk of their results being influenced by selection bias, despite some of these studies having high response rate.

A further weakness of the included studies is that many did not sample a cohort that is representative of all NHS surgeons. For example, in four studies included only consultants and consultants were over-represented in another two studies, as can be seen in the *Study characteristics* table.(31–33,49,51,56) Other studies considered only one surgical speciality.(31–34,53) These are weaknesses because they can result in a fragmented view of the issues surrounding burnout in surgeons.

Future areas of work

The included studies show that extensive work has been done establishing the scale and scope of burnout in NHS surgeons. There are a few areas that are not appropriately described by the current literature which may benefit from further research. These are the role of ethnicity in developing burnout, the relationship between burnout and suicide and the reasons underpinning there being no difference in burnout rates between genders in a predominately male speciality.

Methodologically, authors who use the MBI tool should use the validated cut-off criteria available in the MBI manual rather than using their own unvalidated criteria.⁽¹¹⁾ Doing so will make a future meta-analysis possible. Also, the burnout literature would benefit from a wider range of study designs than quantitative cross-sectional methods alone to explore the issue from different perspectives.

Most importantly, future work should shift away from continuing to describe effectively the same problem ad nauseam and should instead focus on doing something to fix it. The absence of long-term and high-quality randomised controlled trials is the obvious gap in the literature. As identified by a systematic review of burnout interventions, researchers must focus on determining the optimal combination between individual-focused and organisational-level interventions and the frequency of interventions that is necessary over-time for an optimal reduction in burnout.⁽¹⁰²⁾

Conclusion

Burnout is a substantial problem amongst NHS surgeons in the UK. Approximately one third of NHS surgeons between 2000 and 2018 suffered from burnout with some estimates suggesting over half of surgeons had burnout.

Current evidence suggests that burnout is a different phenomenon from stress, depression, physical fatigue. Burnout is thought to be caused when a highly motivated individual enters a job, which usually involves helping others, with unattainably high expectations for that job to bring purpose to their life. When these high expectations are not achieved, the person begins a process of feeling like they are failing, feeling guilty for failing, then detaching themselves for their work and eventually working less effectively. At this point, the person is considered to have burnout.

As a result of this multi-factorial process, many risk factors for developing burnout are discussed which centre around two main areas. Firstly, someone feeling unable to use their professional skills and secondly, having a weak support network with inadequate coping strategies. The effects of burnout appear to be wide-reaching because of a surgeon's pivotal role in delivering high quality patient care.

Both individually targeted and organisational-level interventions can reduce burnout. Future research should focus on determining the optimal mix of interventions and the frequency with which they must be delivered to prevent burnout in the long-term. Practical work should focus on training leaders to implement burnout reducing interventions effectively throughout all stages of surgical training and consultancy.

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Appendix 1 – Full PROSPERO entry

PROSPERO International prospective register of systematic reviews



Prevalence, risk factors and effects of burnout on surgeons in the United Kingdom and the implications for NHS stakeholders: a systematic review
Elliott Sharp, Gaurish Chawla, Ceri Butler

Citation

Elliott Sharp, Gaurish Chawla, Ceri Butler. Prevalence, risk factors and effects of burnout on surgeons in the United Kingdom and the implications for NHS stakeholders: a systematic review. PROSPERO 2019 CRD42019119900 Available from:
http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42019119900

Review question

Primary question:

What is the prevalence of burnout in surgeons in the UK between 2000 to 2018?

Secondary questions:

What are the risk factors for burnout in surgeons in the UK between 2000 and 2018?

What are the effects to the individual of burnout in surgeons in the UK between 2000 and 2018?

What are the effects to organisations of burnout in surgeons in the UK between 2000 and 2018?

What are interventions that can protect against and prevent burnout in surgeons in the UK between 2000 and 2018?

Searches

Databases: MEDLINE and Health Management Information Consortium (HMIC) (and citations of included studies will be screened)

Search dates: 2000-2018

Language: English only

Types of study to be included

Any (excluding reviews).

Condition or domain being studied

Burnout defined as a "physical or mental collapse caused by overwork or stress". This often includes three domains: depersonalisation, personal satisfaction and emotional exhaustion.

Participants/population

Surgeons who practice in the United Kingdom. Surgeon is defined as core surgical trainee, registrar, fellow or consultant in any of the following: cardiothoracic surgery, general surgery (including its subdivisions of breast, colorectal, endocrine, upper gastrointestinal, transplant and military), neurosurgery, oral and maxillofacial, otolaryngology (ENT), paediatric surgery, plastic surgery, trauma and orthopaedic surgery, urology, vascular, gynaecology and ophthalmology.

Intervention(s), exposure(s)

Being a surgeon who practices in the United Kingdom.

Comparator(s)/control

From this review, between UK surgical sub-specialities. Considering results from other reviews, between other UK physicians and between surgeons practicing in other countries.

Context

Main outcome(s)

Prevalence (mean and median) of burnout in the defined study population.

Timing and effect measures

Between 2000 and 2018.

Additional outcome(s)

Risk factors assessed to be associated with burnout.

Protective factors against burnout.

Effects associated with burnout.

Interventions used to reduce burnout.

Timing and effect measures

Between 2000 and 2018.

Data extraction (selection and coding)

Titles and abstracts will be screened in OVID using the search strategy and studies that potentially meet the inclusion criteria will have the full text articles retrieved and screened. Any articles that are not eligible during this title and abstract or full text screen will be excluded with reasons. Study selection will not be blinded. No authors will be contacted. Data review and extraction will be performed by Elliott Sharp under the supervision of Gaurish Chawla. This process will be reviewed by Ceri Butler who will also act if there are any discrepancies between the Principal Investigator and Masters Student Researcher.

A standardised spreadsheet will be used to extract data items from the studies. These data items are: author(s), year of publication, publication title, study design, study period, age of participants, sex of participants, surgical speciality of participants, training grade of participants, number of participants, response rate (both number and percentage), tool used to assess/measure burnout, prevalence of burnout (mean and median), risk factors for burnout, effects of burnout and interventions to protect against or prevent burnout.

Risk of bias (quality) assessment

Risk of bias in individual studies will be assessed using Critical Appraisal Skills Programme (CASP) checklists for the relevant study design. Risk of bias assessment will be performed by Elliott Sharp under supervision of Gaurish Chawla where discrepancies will be resolved by Ceri Butler.

Strategy for data synthesis

Only aggregate level data will be used. A narrative synthesis will occur for all studies that meet the eligibility criteria. Quantitative synthesis will occur if sufficient studies are homogenous that: use a quantitative scale to study burnout, provide a sample mean, provide a sample range.

Analysis of subgroups or subsets

Exploration of burnout at an aggregate level by age, sex, training level and sub-speciality will be conducted if data is sufficiently homogenous.

Contact details for further information

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Organisational affiliation of the review

Brighton & Sussex Medical School

Review team members and their organisational affiliations

PROSPERO
International prospective register of systematic reviews



Mr Elliott Sharp. Brighton & Sussex Medical School
Dr Gaurish Chawla. Brighton & Sussex Medical School
Miss Ceri Butler. Brighton & Sussex Medical School

Type and method of review

Epidemiologic, Narrative synthesis, Systematic review

Anticipated or actual start date

01 January 2019

Anticipated completion date

31 August 2019

Funding sources/sponsors

Brighton & Sussex Medical School. No funding sources.

Conflicts of interest

Language

English

Country

England

Stage of review

Review Completed not published

Subject index terms status

Subject indexing assigned by CRD

Subject index terms

Burnout, Professional; Humans; Job Satisfaction; Prevalence; Risk Factors; Surgeons; United Kingdom

Date of registration in PROSPERO

21 January 2019

Date of publication of this version

18 June 2019

Revision note for this version

No major changes have been made. Only updating the status of the review and clarifying timing effects that had already been declared.

Details of any existing review of the same topic by the same authors

Stage of review at time of this submission

Stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	Yes
Data extraction	Yes	Yes
Risk of bias (quality) assessment	Yes	Yes
Data analysis	Yes	Yes

Revision note

No major changes have been made. Only updating the status of the review and clarifying timing effects that had already been declared.

Versions

21 January 2019

06 March 2019

24 April 2019

18 June 2019

PROSPERO

This information has been provided by the named contact for this review. CRD has accepted this information in good faith and registered the review in PROSPERO. The registrant confirms that the information supplied for this submission is accurate and complete. CRD bears no responsibility or liability for the content of this registration record, any associated files or external websites.

Appendix 2 – MEDLINE search strategy

Key

* = wildcard character

ti = search within title

ab = search within abstract

adj = words within brackets are found directly next to each other in any order

adj2 = words within brackets are found with one word in between each other in any order

/ = Medical Subject Heading (MeSH) term

yr = year

Search number	Search term	Results
1	surgeon*.ti,ab	185271
2	gynecologist*.ti,ab.	9753
3	gynaecologist*.ti,ab.	3370
4	neurosurgeon*.ti,ab.	9162
5	ophthalmologist*.ti,ab.	12606
6	otolaryngologist*.ti,ab.	5392
7	otorhinolaryngologist*.ti,ab.	1149
8	urologist*.ti,ab.	10546
9	traumatologist*.ti,ab.	367
10	physician*.ti,ab.	365743
11	doctor*.ti,ab.	119109
12	consultant*.ti,ab.	21093
13	fellow*.ti,ab.	24658
14	registrar*.ti,ab.	3537
15	trainee*.ti,ab.	22898
16	burnout.ti,ab.	9290
17	stress.ti,ab.	672984
18	fatigue.ti,ab.	86133
19	(quality adj2 life).ti,ab.	252695
20	depression.ti,ab.	306537
21	(emotional adj exhaustion).ti,ab.	2198
22	depersonalization.ti,ab.	2216
23	depersonalisation.ti,ab.	321
24	(personal adj accomplishment).ti,ab.	1002

25	workload.ti,ab.	22355
26	(job adj satisfaction).ti,ab.	7820
27	(personal adj satisfaction).ti,ab.	443
28	(United adj Kingdom).ti,ab.	34741
29	UK.ti,ab.	99869
30	britain.ti,ab.	14907
31	british.ti,ab.	46838
32	England.ti,ab.	46631
33	English.ti,ab.	150561
34	Wales.ti,ab.	22289
35	Welsh.ti,ab.	1962
36	Scotland.ti,ab.	15595
37	Scottish.ti,ab.	8743
38	(Northern adj Ireland).ti,ab.	4726
39	Irish.ti,ab.	8739
40	NHS.ti,ab.	30388
41	(national adj health adj service).ti,ab.	11781
42	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15	724028
43	16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27	1257825
44	28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41	419767
45	42 and 43 and 44	2972
46	surgeons/	5407
47	neurosurgeons/	336
48	ophthalmologists/	204
49	maxillofacial surgeons/	82
50	orthopedic surgeons/	394
51	otolaryngologists/	96
52	urologists/	186
53	consultants/	6564
54	physicians/	84861
55	burnout, professional/	10552
56	occupational stress/	831
57	fatigue/	26808
58	mental fatigue/	1480
59	quality of life/	176668

60	stress, psychological/	113916
61	depression/	109332
62	depersonalization/	1487
63	workload/	20121
64	job satisfaction/	23702
65	United Kingdom/	221114
66	England/	85412
67	Wales/	13710
68	Scotland/	23986
69	Northern Ireland/	4738
70	46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54	97343
71	55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64	434971
72	65 or 66 or 67 or 68 or 69	335849
73	70 and 71 and 72	379
74	45 or 73	3271
75	limit 74 to yr="2000 - 2018"	2336

Appendix 3 – HMIC search strategy

Key

* = wildcard character

ti = search within title

ab = search within abstract

adj = words within brackets are found directly next to each other in any order

adj2 = words within brackets are found with one word in between each other in any order

/ = controlled vocabulary term (HMIC equivalent to Medical Subject Headings)

yr = year

Search number	Search term	Results
1	surgeon*.ti,ab.	1358
2	gynecologist*.ti,ab.	6
3	gynaecologist*.ti,ab.	184
4	neurosurgeon*.ti,ab.	28
5	ophthalmologist*.ti,ab.	84
6	otolaryngologist*.ti,ab.	9
7	otorhinolaryngologist*.ti,ab.	4
8	urologist*.ti,ab.	29
9	traumatologist*.ti,ab.	1
10	physician*.ti,ab.	6986
11	doctor*.ti,ab.	14568
12	consultant*.ti,ab.	4814
13	fellow*.ti,ab.	650
14	registrar*.ti,ab.	1044
15	trainee*.ti,ab.	1322
16	burnout.ti,ab.	461
17	stress.ti,ab.	4380
18	fatigue.ti,ab.	543
19	(quality adj2 life).ti,ab.	4805
20	depression.ti,ab.	4439
21	(emotional adj exhaustion).ti,ab.	125
22	depersonalization.ti,ab.	20
23	depersonalisation.ti,ab.	75
24	(personal adj accomplishment).ti,ab.	64

25	workload.ti,ab.	2375
26	(job adj satisfaction).ti,ab.	1078
27	(personal adj satisfaction).ti,ab.	15
28	(United adj Kingdom).ti,ab.	5718
29	UK.ti,ab.	21552
30	britain.ti,ab.	4368
31	british.ti,ab.	6322
32	England.ti,ab.	22625
33	English.ti,ab.	4730
34	Wales.ti,ab.	8033
35	Welsh.ti,ab.	783
36	Scotland.ti,ab.	5106
37	Scottish.ti,ab.	2312
38	(Northern adj Ireland).ti,ab.	1741
39	Irish.ti,ab.	481
40	NHS.ti,ab.	47258
41	(national adj health adj service).ti,ab.	8318
42	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15	27394
43	16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27	16236
44	28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41	103094
45	42 and 43 and 44	609
46	surgeons/	299
47	gynaecologists/	59
48	ophthalmologists/	6
49	medical staff/	8472
50	junior medical staff/	1029
51	occupational stress/	1227
52	stress/	1670
53	psychological stress/	1670
54	Human fatigue/	109
55	quality of life/	2672
56	depression/	2652
57	mental health/	6242
58	morale/	240
59	workload/	1269

60	job satisfaction/	1079
61	satisfaction/	227
62	united kingdom/	8713
63	great britain/	486
64	england/	7962
65	wales/	3830
66	scotland/	4899
67	northern ireland/	1483
68	nhs/	41071
69	46 or 47 or 48 or 49 or 50	9673
70	51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61	15481
71	62 or 63 or 64 or 65 or 66 or 67 or 68	61498
72	69 and 70 and 71	81
73	45 or 72	669
74	limit 73 to yr="2000 - 2018"	445

Appendix 4 – AXIS Appraisal Tool

Taken directly from Downes et al., 2016.(106)

Appraisal of Cross-sectional Studies

	Question	Yes	No	Don't know/ Comment
Introduction				
1	Were the aims/objectives of the study clear?			
Methods				
2	Was the study design appropriate for the stated aim(s)?			
3	Was the sample size justified?			
4	Was the target/reference population clearly defined? (Is it clear who the research was about?)			
5	Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?			
6	Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?			
7	Were measures undertaken to address and categorise non-responders?			
8	Were the risk factor and outcome variables measured appropriate to the aims of the study?			
9	Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?			
10	Is it clear what was used to determined statistical significance and/or precision estimates? (e.g. p-values, confidence intervals)			
11	Were the methods (including statistical methods) sufficiently described to enable them to be repeated?			
Results				
12	Were the basic data adequately described?			
13	Does the response rate raise concerns about non-response bias?			
14	If appropriate, was information about non-responders described?			
15	Were the results internally consistent?			
16	Were the results presented for all the analyses described in the methods?			
Discussion				
17	Were the authors' discussions and conclusions justified by the results?			
18	Were the limitations of the study discussed?			
Other				
19	Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?			
20	Was ethical approval or consent of participants attained?			

Appendix 5 – Full title and abstract exclusion reasons

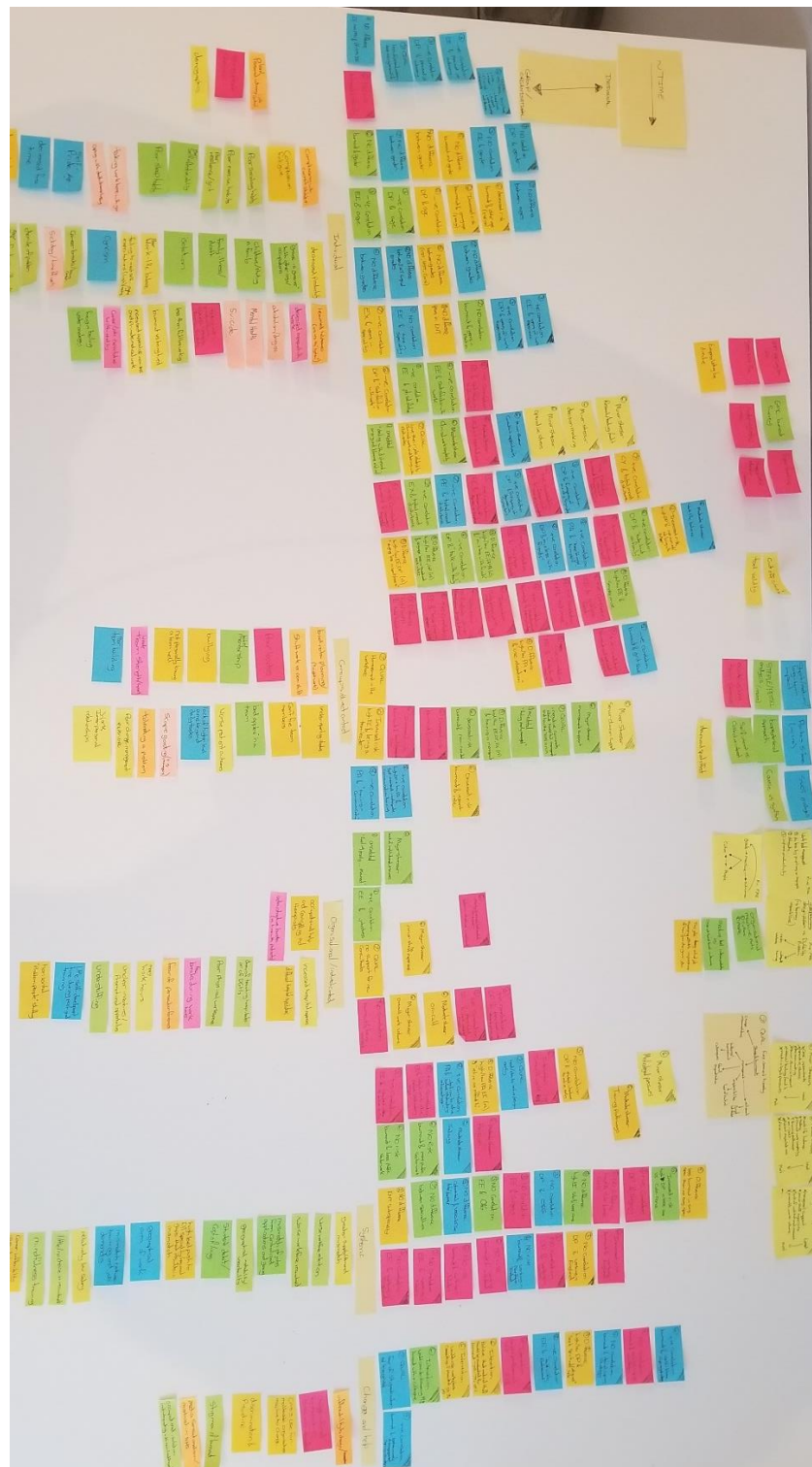
<i>Number of exclusion criteria met</i>	<i>Criteria</i>	<i>MEDLINE</i>	<i>HMIC</i>	<i>Total</i>
<i>1 criterion</i>	a	0	0	0
	b	20	4	24
	c	84	62	146
	d	174	74	248
	e	20	3	23
<i>2 criteria</i>	a+b	5	0	5
	a+c	0	0	0
	a+d	5	0	5
	a+e	0	0	0
	b+c	12	0	12
	b+d	32	0	32
	b+e	2	0	2
	c+d	1164	262	1426
	c+e	5	0	5
	d+e	14	0	14
	a+b+c	3	0	3
<i>3 criteria</i>	a+b+d	3	0	3
	a+b+e	0	0	0
	a+c+d	13	0	13
	a+c+e	0	0	0
	a+d+e	0	0	0
	b+c+d	339	3	342
	b+c+e	0	0	0
	b+d+e	3	0	3
	c+d+e	311	13	324
	a+b+c+d	17	0	17
	a+b+c+e	0	0	0
<i>4 criteria</i>	a+b+d+e	0	0	0
	a+c+d+e	20	0	20
	b+c+d+e	19	0	19
	a+b+c+d+e	1	0	1
<i>Total excluded</i>		2266	421	2687
<i>Screen</i>		86	23	109
<i>Total results</i>		2352	444	2796

Key

a	Not in English
b	Not in UK
c	No surgeons
d	No burnout
e	Not correct study design

Appendix 6 – Concept mapping

A map of all concepts to consider discussing in this project was created. On the top half, each coloured note represents a separate information point that was extracted from included studies. On the bottom half, each coloured note represents a separate concept that was thought up through brainstorming but not necessarily addressed in an included study to ensure no concepts were missed. The notes are also split into columns based on the 'perspectives' in the discussion section.



Appendix 7 – Personal reflection

Overall, I really enjoyed conducting this systematic review writing this dissertation. The topic sustained my interest right until the end despite some graduates suggesting people grow to loathe their dissertation topics. It may be due to the Baader-Meinhof phenomenon, but I feel that burnout is an active field with lots of grassroots and high-level interest, so I feel that this project was conducted at a valuable time. I hope that it will be of use to people who need it – which it seems like there are a lot of.

From a methodological perspective, I found it valuable to learn how a seemingly objective process like a systematic review still requires certain decisions to be made that can make the process more subjective. By spending time meticulously analysing and appraising various studies I feel I am better able to critically appraise future studies I will read. I am also glad I listened to those who that suggested I ‘front-load’ my effort for a systematic review as I felt fortunate to not have to redo any sizable portions of this review because of extensive planning and testing. I would recommend that future systematic reviewers heed this advice.

When considering the results, discussion and implications of this review, I was surprised and how many different areas burnout impacted. I found myself learning a great deal about topics that were once peripheral to me such as Modernising Medical Careers, European Working Time Directive and various fields in psychology.

Writing this dissertation during a ‘siesta’ from undergraduate medical training has provided me a fantastic opportunity to explore additional areas I find interesting supplementary to medicine. I hope this opportunity has helped me to become a more well-rounded clinician.

Appendix 7 – Poster

Burnout in NHS Surgeons

PROSPERO: CRD42019119900

Elliott Sharp¹, Gaurish Chawla², Ceri Butler²

1. MSc Student, Brighton & Sussex Medical School

2. Department of Medical Education, Brighton & Sussex Medical School

BACKGROUND

- 'Burnout' was first used in 1974 when it was noticed healthcare workers became emotionally tired, lost motivation in their work and became less effective at their job.
- Burnout is now typically defined as end process of disillusionment in a job when a person becomes less effective at their work.**
- Surgeons are thought to be at a high risk of developing burnout because of high job expectations when entering the profession. This is concerning because burnout negatively impacts the health of a surgeon and the quality of patient care.
- Prevalence, risk-factors, effects and interventions for burnout in NHS surgeons are poorly understood.

AIMS

Across NHS surgeons in the UK between 2000 and 2018...

Primary:

- To establish the prevalence of burnout.

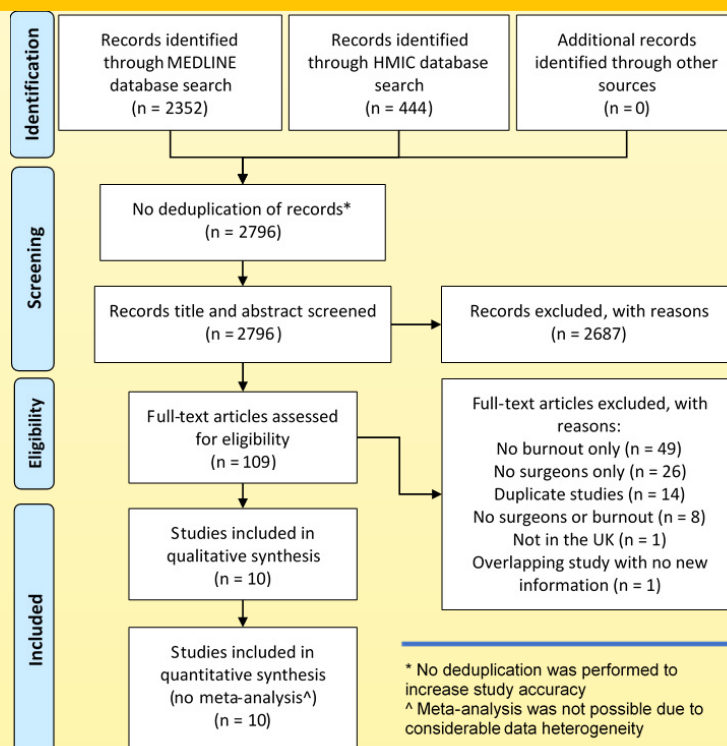
Secondary:

- To evaluate the risk factors for burnout.
- To evaluate the effects of burnout.
- To evaluate interventions to protect against burnout.

METHODS

- Systematic review designed and conducted according to PRISMA-P guidelines.(1)
- Review conducted between 21st January and 18th June 2019.
- Eligibility criteria: any design, evaluated burnout in surgeons working in NHS in the UK, published 2000-2018.
- Search strategy designed with help of a medical librarian.
- MEDLINE and Health Management Information Consortium databases searched.
- Studies appraised using the Appraisal Tool for Cross-sectional Studies (AXIS).(2)
- Quantitative analysis and qualitative synthesis of results.
- Meta-analysis not possible due to considerable study heterogeneity.

PRISMA FLOW DIAGRAM



RESULTS

Study	Vijen-dren, 2018	Khan, 2018	McCain, 2017	Walker, 2016	O'Kelly, 2015	Upton, 2011	Sharma, 2007a	Sharma, 2007b	Catt, 2005	Taylor, 2005
Tool	aMBI	MBI (EE & DP)	ProQOL V	Olden-burg	MBI	MBI-GS	MBI	MBI	MBI	MBI (EE)
High definition	>75th centile	EE≥27 DP≥13	≥57	N/A	EE ≥27 DP≥13 PA≤31	Upper 1/3 of scores	EE ≥27 DP≥13 PA≤31	EE ≥27 DP≥13 PA≤31	EE ≥27 DP≥13 PA≤31	EE ≥27
Prevalence of high burnout	28.9%	EE: 42.4% DP: 25.0%	22.6%	N/A	51.3%	EX: 33% CY: 32% PE: 6%	EE: 31.7% DP: 21.2% PA: 28.8%	EE: 31.1% DP: 21.2% PA: 28.8%	EE: 22.2% DP: 29.6% PA: 29.6%	EE: 41%

Table: Burnout tools used, definition of high burnout and the prevalence of burnout across the ten included studies.



Figure: A thematic analysis of all risk-factors for burnout, effects of burnout and areas to target for interventions to protect against burnout.

RECOMMENDATIONS

Surgeons:

- Be realistic, not romantic about modern surgical work.
- Develop healthy coping behaviours like exercising, hobbies and seeing friends.
- Do not become withdrawn; seek help if feeling emotionally drained.

Patients:

- Recognise the limitations of surgeons as individuals and part of an organisation.

Clinical leaders:

- Proactively but informally screen for symptoms of burnout in team members.
- Consider the appropriate mix of interventions against burnout to implement.

Organisational leaders:

- Promote development of supportive behaviours amongst staff.
- Use a variety of organisational and individual interventions over the long-term.

Regional-level and national-level leaders:

- Design surgical training at all levels to reflect a realistic modern surgical career.
- Rebalance use of 'professionalism' to make personal weaknesses recognised.

LIMITATIONS

- Only one person screening, appraising and extracting data from studies.
- No ethical approval to request missing data from study authors.
- Considerable study heterogeneity meant meta-analysis was not possible.
- Cross-sectional quantitative self-survey was predominant methodology meaning causal effects could not be established.

FUTURE WORK

- Future work must focus around determining the optimal combination, frequency and nature of individual-focused and organisational-level interventions to reduce burnout and mitigate its effects.

CONCLUSION

- Approximately 1/3 of NHS surgeons in the UK suffered from burnout between 2000 and 2018.
- Developing burnout is a multifactorial process that is most commonly experienced by highly motivated individuals who have unattainably high job expectations.
- Effects of burnout are wide-reaching and negatively impact the health of a surgeon, the quality of patient care they deliver and reduce retention rates of surgeons.
- Both individually-targeted and organisational-level interventions have the potential to reduce burnout.

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