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Burnout, Wellbeing and Defensive Medical Practice amongst Obstetricians and Gynaecologists in the United Kingdom: cross-sectional survey study

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Burnout, Wellbeing and Defensive Medical Practice amongst Obstetricians and Gynaecologists in the United Kingdom: Cross-sectional survey study

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Abstract

Objectives: To determine the prevalence of burnout in doctors practising obstetrics and gynaecology, and assess the association with defensive medical practice and self-reported wellbeing.

Design: Nationwide online cross-sectional survey study; December 2017-March 2018.

Setting: Secondary care hospitals in the United Kingdom

Participants: 5661 practising Obstetrics and Gynaecology consultants, specialty and associate specialist doctors and trainees registered with the Royal College of Obstetricians and Gynaecologists

Primary and Secondary Outcome Measures: Prevalence of burnout using the Maslach Burnout Inventory and defensive medical practice (avoiding cases or procedures, overprescribing, over-referral) using a 12-item questionnaire. The odds ratios of burnout with defensive medical practice and self-reported wellbeing.

Results: 3102/5661 doctors (55%) completed the survey. 3073/3102 (99%) met the inclusion criteria (1462 consultants, 1357 trainees and 254 specialty and associate specialist doctors). 1116/3073 (36%) doctors met the burnout criteria, with levels highest amongst trainees (580/1357 [43%]). 258/1116 (23%) doctors with burnout reported increased defensive practice compared to 142/1957 (7%) without (adjusted odds ratio 4.35, 95% CI 3.46 to 5.49). Odds ratios of burnout with wellbeing items varied between 1.38 and 6.37, and were highest for anxiety (3.59, 95% CI 3.07 to 4.21), depression (4.05, 95% CI 3.26 to 5.04), and suicidal thoughts (6.37, 95% CI 95% CI 3.95 to 10.7). In multivariable logistic regression, being of younger age, white or 'other' ethnicity, and graduating with a medical degree from the UK or Ireland had the strongest associations with burnout.

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Conclusions: High levels of burnout were observed in obstetricians and gynaecologists and particularly amongst trainees. Burnout was associated with both increased defensive medical practice and worse doctor wellbeing. These findings have implications for the wellbeing and retention of doctors as well as the quality of patient care, and may help to inform the content of future interventions aimed at preventing burnout and improving patient safety.

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Article Summary - Strengths and limitations of this study

- First nationwide survey in the United Kingdom which examines the prevalence of burnout as well as its relationship to defensive medical practice and self-reported wellbeing
- This study includes a large number of doctors working in obstetrics and gynaecology and has a good response rate
- Use of the Maslach Burnout Inventory, a widely available and validated tool for measuring burnout amongst doctors allows for comparison with other research in this field
- The study is limited by the fact that it is cross-sectional in design which introduces the possibility of selection bias which must be considered when interpreting the findings

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Introduction

Doctor burnout and mental wellbeing is an important concern internationally(1-4) because of the high reported prevalence(5) and serious consequences for both staff and patients.(6) Burnout syndrome, which is a response to prolonged exposure to occupational stress, is characterised by three dimensions: emotional exhaustion, depersonalisation and reduced personal accomplishment.(7) International studies have shown that burnout is nearly twice as common amongst doctors compared with other healthcare workers.(6) A recent survey by the General Medical Council reported that 24% of trainees and 21% of trainers from across the United Kingdom (UK) described 'feeling burnt out' based on self-reported symptoms(8) which highlights the scale of this problem.(5) The consequences of burnout amongst doctors have been investigated primarily in the United States (USA)(9) with only a few large studies conducted in Europe(10-13) and Asia(14, 15) to validate these findings internationally. These include a negative impact on health including higher rates of substance abuse, depression, suicide and a poorer quality of life.(16, 17) Moreover, burnout in doctors has a significant impact on the productivity of healthcare organisations, intentions to leave medical practice, and both the quality and safety of patient care.(18-22) At present, it is unclear if these findings and the proposed interventions can be extrapolated to healthcare in the United Kingdom (UK) due to a paucity of data on doctor burnout in this setting.(23, 24)

Evidence from studies in Europe(25) and the USA(2) suggest that burnout may be experienced by up to half of doctors in obstetrics and gynaecology (O&G),(26, 27) and that the prevalence of burnout in O&G is one of the highest of any specialty. This has been associated with increased job turnover and reduced workforce retention.(28, 29) Furthermore, a key consequence of doctor burnout is the impact on patient care. A recent meta-analysis suggested burnt out doctors are twice as likely to be involved in patient safety

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incidents and deliver a lower quality of patient care.(30) This is a significant issue in O&G, which is a specialty associated with high levels of litigation,(31) incurring considerable costs to healthcare systems; obstetric claim settlements cost the NHS over £500 million annually.(32) These high litigation rates in O&G are partly attributable to the large number of safety incidents and complaints(33, 34) and a parallel culture of intolerance when errors are made. The overall impact of this 'complaints culture' on doctors is substantial.(35) A UK wide study on the impact of complaints on doctor welfare demonstrated that they are associated with an increased risk of depression, anxiety and suicidal ideation as well as increased defensive practice.(36-38) Defensive medical practice (DMP) is defined as a doctor's deviation from standard practice in response to complaints or criticism(39) which can potentially harm patients as a result of either over-investigation and treatment or because clinicians avoid involvement in difficult cases.(31) This has a further detrimental impact on productivity and the quality of care being delivered. Moreover, defensive medical practice represents a highly significant strain on healthcare resources and is estimated to cost $46 billion annually in the US.(40)

Within the UK, pregnancy is the most common reason for hospital admission and there has been great focus by the government through initiatives such as 'The Maternal and Neonatal Health Safety Collaborative'(41) to implement strategies which aim to improve maternity safety and outcomes. A facet of this work involves 'understanding the culture' of the O&G workforce.(41) However, to our knowledge, there is currently no quantitative data relating to burnout amongst doctors working in O&G in the UK to inform potential interventions and healthcare policy.(42) Thus, there is a clear need to identify the prevalence and factors associated with burnout amongst doctors to bring about NHS workforce sustainability and understand the impact on quality of patient care.(5) We conducted a nationwide cross-sectional survey study to assess burnout, defensive medical practice and associated personal

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and work factors in O&G doctors in the UK. The aims were firstly to ascertain the prevalence of burnout in the cohort, secondly to determine the levels of DMP and doctor wellbeing and explore their relationship with burnout. Finally, we aimed to explore the relationships between age, gender, ethnicity, doctor seniority, and both burnout and DMP.

Methods

All consultants, specialty and specialty associate (SAS) doctors and trainees working in Obstetrics and Gynaecology in the United Kingdom and registered with the Royal College of Obstetricians and Gynaecologists (RCOG) were invited to participate in this study between December 2017 and March 2018. Doctors were sent an email containing information describing the study and a link to an encrypted online questionnaire. We made it clear to the participants in the invitation email that their participation was voluntary and that responses would be both anonymous and untraceable. Informed consent was implied upon return of the survey. Unique surveys were created for each of the grades described and sent as part of the annual RCOG Workforce and Welfare survey that collects data about doctors' clinical practice and working patterns. During the survey period, 4 reminders were sent out. All actively practising doctors were included as well as doctors who were on sick leave, maternity leave, or suspended from practice. Exclusion criteria included doctors who are fully retired, on a career break, in between jobs, not working in the UK at the time of the survey or those who are currently not employed.

The Survey

We used a cross-sectional survey design with three participant groups: consultants, SAS doctors and trainees, with each group completing a slightly different version of the questionnaire. We estimate that the time taken to complete the questionnaire was 20 minutes.

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Participants were asked to provide information on demographic variables, including age, gender, ethnicity (Office of National Statistics classification(43)), relationship status and number of children. In addition, they were asked about job and organisational attributes and factors such as training grade or level of specialisation and rota design. These parameters were chosen based on previous studies suggesting that they have an association with burnout.(44)

Main Outcomes and Measures

Symptoms of Burnout

We measured burnout using the Maslach Burnout Inventory Human Services Survey for Medical Personnel(45) (MBI), a validated 22-item tool to identify and characterise burnout. The MBI has three subscales to evaluate the 3 domains of burnout: emotional exhaustion (EE), depersonalisation (DP), and low personal accomplishment (PA). As in previous studies and according to convention,(9, 44, 45) burnout was defined as high EE (scores of 27 or greater; possible score range from 0-54), or high DP (scores of 10 or greater; possible score range from 0-30). The PA score was also measured with low PA defined as scores of 33 or lower (possible score range from 0-48) but this was not used as a criterion for burnout in line with previous published work on the subject.(44)

Defensive Medical Practice

DMP was assessed using a 12-item questionnaire, which has previously been developed and described.(36, 38) Items are measured on a 5-point Likert scale (ranging from never to often). Nine items quantify 'hedging' behaviour, which is when doctors are overcautious, leading to overprescribing or over-investigation. 3 items quantify 'avoidance' behaviour, which includes not taking on complicated patients and avoiding certain procedures or more

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difficult cases. We confirm this factor structure in eMethods in the Supplement. Consistent with previous work, we defined elevated hedging behaviour as a score of 13 or more (possible score range from 0-36), and elevated avoidance behaviour as a score of 5 or more (possible score range from 0-12).(36) We defined any DMP as having elevated levels of avoidance and/or hedging.

Doctor Wellbeing

Doctors were asked to self-report on a variety of common medical illness including, cardiovascular problems, gastro-intestinal problems, depression, anxiety, anger and irritability, suicidal thoughts, sleep problems, relationship problems, headaches, minor colds, recurring respiratory infections, and alcohol/drug misuse.

Statistical Analyses

Spearman correlations between the MBI and DMP subscales and DMP were calculated. In order to investigate the association between burnout, DMP, and wellbeing, we calculated odds ratios based on univariable logistic regression with Firth bias correction.

Multivariable logistic regression with Firth bias correction was used to investigate the association between demographic variables and burnout, with results reported as adjusted odds ratios and visualised with a nomogram. The predictors of burnout in this analysis were age, gender, ethnicity, grade, parity, current relationship, medical degree (MD) origin (UK or Ireland vs. other), and work status (full time vs. less than full time). A similar multivariable analysis was performed with DMP as the dependent variable. For this model, the same predictors were used, with burnout added as an additional predictor.

For the logistic regression analyses, missing values were singly imputed using the method of fully conditional specification based on the abovementioned list of predictors, the MBI subscales (as numerical scores), and the DMP subscales (as numerical scores).

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R version 3.5.0 was used for the statistical analysis.

Patient and Public Involvement

This research was designed and conducted without patient and public involvement.

Results

Respondent Characteristics

The survey was sent to a total of 5661 doctors. The overall response rate was 54.8% (3102/5661). We received questionnaires from 1481 consultants (53% of 2786 consultants contacted), 1364 trainees (57% of 2375 trainees contacted), and 257 SAS doctors (51% of 500 contacted). Of these, 1462 consultants, 1357 trainees, and 254 SAS doctors were actively practising and included in the analysis. The mean age was 50 years for consultants, 33 years for trainees, and 47 years for SAS doctors (Table 1). A majority of doctors were female (58% of the consultants, 80% of the trainees, 68% of the SAS doctors). Consultants (57%) and trainees (64%) were predominantly white, whereas SAS doctors were most often of Asian ethnicity (42%). Descriptive statistics by demographic variables are presented in Table 2. Information on missing data is presented in eTable 1 in the Supplement.

We were unable to reliably check if our sample for all doctors was representative of the entire population to whom the study survey was sent with regards to age, gender and ethnicity as the RCOG do not a hold a centralised database of these variables for all doctors against which to compare our data. However, the RCOG sent a different survey (Training Evaluation Form (TEF)) to 1956 trainees in January 2018, which was responded to by 1754 trainees (89.7%) (eTable 2 in the Supplement) . When comparing our data to this survey, we found that our trainee sample was comparable in terms of gender (79.1% females in the TEF database compared to 79.8% in our cohort). Furthermore our study population had similar

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numbers of trainees in the 20-29 and 30-39 age ranges (28.3% and 62.3% respectively in the TEF database compared to 24.8% and 66.1% respectively in our database). Our trainee cohort consisted of more doctors in the 40-59 age range (9.1% compared to 6.1% in the TEF database) which may be accounted for by missing data in the TEF database. In terms of ethnicity, our sample was also comparable for all groups.

Burnout

Regarding the MBI, the percentage of participants meeting the criteria for burnout was 36% overall (1116/3073); 31% for consultants (460/1462), 43% for trainees (580/1364), and 30% for SAS doctors (76/254) (Table 1). Between 26% and 32% met the criteria for high EE, between 12% and 29% met the criteria for high DP, and between 26% and 39% met the criteria for low PA. The EE and DP scales had a Spearman correlation of 0.57, whereas both subscales correlated negatively with PA (-0.30 and -0.34, respectively) (eTable 3 and eFigure 1 in the Supplement).

Defensive Medical Practice

Increased DMP, according to our criteria, was observed in 13% overall (400/3073); 16% of consultants (231/1462), 11% of trainees (149/1364), and 8% of SAS doctors (20/254). Between 4% and 9% met our criteria for increased avoidance, and between 4% and 11% met our criteria for increased hedging. These subscales had a Spearman correlation of 0.41 (eTable 3 and eFigure 1 in the Supplement).

Of all participants who met the criteria for burnout, 23% met the criteria for increased DMP (258/1116) (Table 3). Of participants who did not meet the criteria for burnout, 7% reported increased DMP (142/1957). The crude odds ratio (OR) was 3.84 (95% CI 3.08 to 4.79). The

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relationship was similar for all categories of doctors, and was observed for avoidance as well as hedging behaviour (Table 3 and eTable 4 in the supplement).

Doctor Wellbeing

Doctors with burnout had a higher prevalence of self-reported medical illness (Table 4). Highest odds ratios were observed for suicidal thoughts (6.37, 95% CI 3.95 to 10.7), depression (4.05, 95% CI 3.26 to 5.04), anxiety (3.59, 95% CI 3.07 to 4.21), anger/irritability (3.51, 95% CI 3.00 to 4.10) and sleep problems or insomnia (3.15, 95% CI 2.70 to 3.67). 13.5% (n=416) of all doctors reported depression, but this was 7.4% for doctors without burnout and 24.4% for doctors with burnout. Furthermore, 2.9% (n=90) of all doctors reported suicidal thoughts, 1.0% among doctors without and 6.3% among doctors with burnout. The OR was lowest for cardiovascular problems (1.38, 95% CI 1.07 to 1.78).

Risk factors and correlates

Results of the multivariable models are presented in Table 5 and eFigure 2 in the Supplement. Age, ethnicity, and origin of MD degree were most strongly related to burnout. The older the doctor, the lower the reported level of burnout (adjusted OR per 5 years 0.92, 95% CI 0.87-0.98) and doctors of white and 'other' ethnicity reported higher levels of burnout (41% and 48% respectively) than doctors of other ethnicities (28 to 34%). Doctors with a medical degree from the UK or Ireland also reported higher levels of burnout (42% vs 25%, adjusted OR 1.74, 95% CI 1.41 to 2.16).

Regarding any DMP, burnout was the strongest predictor, followed by age, type of doctor, and ethnicity. The adjusted OR of burnout to predict increased DMP was 4.35 (95% CI 3.46 to 5.49). Consultants, doctors of mixed ethnicity, and to a lesser extent older doctors, reported the highest levels of DMP.

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Discussion

In this large nationwide study, we have shown that just under half of trainees and a third of consultants and SAS doctors working in obstetrics and gynaecology in the UK suffer from burnout using the MBI scoring system. Furthermore, our data suggest that burnout is associated with higher levels of defensive medical practice, and with poorer psychosocial and physical wellbeing.

The prevalence of burnout in this study is in keeping with smaller international studies conducted within obstetrics and gynaecology.(2, 25, 26, 46) A lack of personal accomplishment and emotional exhaustion were the most commonly endorsed subscales, followed by depersonalisation. The particularly high levels of burnout amongst younger doctors, of whom the majority are trainees, may provide insights into a recent RCOG national training and workforce report.(47) In this, nine out of ten O&G trainees reported feeling low in mood, depressed or anxious since starting specialty training(47). In keeping with this finding, and with a number of American studies,(44, 48) our data indicates that burnout is associated with a negative impact on doctor wellbeing and is strongly associated with depression, anxiety and suicidal thoughts. Our study reported a very strong relationship between burnout and suicidal thoughts, which is higher than in previous studies in surgeons in the USA.(49) This may reflect a vulnerability amongst doctors working in O&G compared to other specialties(25, 26) or the differences in healthcare services and culture internationally.

Studies in the USA have indicated an association between burnout and increased workforce turnover(50) which has both financial implications and an impact on healthcare organisation productivity. The RCOG national workforce report(47) has reported that three quarters of

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trainees have considered leaving O&G practice. In our study, as well as the high prevalence of burnout, almost a fifth of trainees reported depression and over a third reported anxiety. These symptoms were markedly more prevalent in the cohort with burnout. Depression has been shown to be independently associated with an increased self-reported likelihood of leaving practice amongst surgeons.(51) Clearly, better understanding the relationship between burnout, wellbeing and staff turnover intentions is of great importance. This knowledge will inform the content of future individual and organisational interventions aimed at preventing burnout and improving the wellbeing and retention of doctors,(52) and are likely to be generalisable across other specialties.

Our finding that burnout is associated with increased DMP supports the concern that doctor burnout impacts the quality of patient care.(30) In 2010, Shanafelt et al. al(16) showed that burnout is an independent predictor of self-reported perceived major medical errors. Our study shows that consultants with burnout are three times more likely to report both avoidance (avoiding cases or procedures) and hedging (overprescribing or over-referral) which may have significant and serious consequences on patient care. The observation in our study that age is inversely associated with burnout is also in keeping with other studies.(53) This may be explained by the fact that doctors who remain within the specialty are inherently more resilient, and that those more affected by burnout may be accounted for in the attrition rate from the specialty. A further noteworthy association in our cohort was that after controlling for other confounding variables, doctors from ethnic minorities were less likely to experience burnout. Similar findings have been reported in studies of trainees and medical students in the USA(54-56) and may be explained by differences in upbringing and life stressors, which may make them more resilient. Consistent with this, we found that doctors who graduated in the UK or Ireland are almost twice as likely to experience burnout.

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Strengths and weaknesses of our study are important to consider in contrast with other research on the prevalence of burnout in doctors. A strength of the study is that it is a nationwide survey which includes a large number of doctors and is the first study to our knowledge that seeks to explore the relationship between burnout (using a validated tool, the MBI) and defensive medical practice. There were several limitations to the present study. Firstly, the overall response rate was only 54.8%; although this is a relatively high response rate for a survey study of this type, it still introduces the possibility of selection bias, which must be considered when interpreting the findings. We believe however that the response rate quoted is the minimum rate and is likely to under-report the response rate from practising clinicians (eDiscussion in the Supplement). Secondly, it is plausible that individuals most affected by burnout may have avoided engaging with the survey and conversely those least impacted may not have seen its value which could bias the results. Lastly, a limitation of a cross-sectional survey study is that it cannot take into account variability of symptoms over time, which may be influenced by other factors such as time of the year and other personal factors.

Conclusions

Our nationwide study reports high levels of burnout amongst obstetricians and gynaecologists in the UK, and that burnout is more prevalent in younger doctors who have trained in the UK. Furthermore, our data suggest that burnout is strongly associated with anxiety, depression, suicidal thoughts and substance misuse. This highlights the impact of burnout on the efficiency and sustainability of the O&G medical workforce, which confirms the need to regularly assess and mitigate burnout in doctors. We have also observed an association between burnout and defensive medical practice, which has implications for the quality and safety of patient care being delivered as well as the wellbeing and retention of

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staff in the NHS. Ultimately, cultivating a greater understanding of doctor burnout and its implications has strategic importance for the sustainability of the NHS workforce and will add to the body of evidence required to improve productivity and patient safety outcomes more broadly across the UK.

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Footnotes

Author Contributions: TB conceptualised and designed the study. All authors contributed to the conduct of the study, data collection and management, interpretation of the data; and preparation, review, and approval of the final version of this manuscript submitted for publication. BVC and NF were responsible for the statistical analysis. TB takes responsibility for the integrity of the data and the accuracy of the data analysis and is the guarantor. TB attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

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Ethical Approval: The Chair of the RCOG Ethics Committee reviewed the study proposal and confirmed that ethical approval was not required as participation by doctors was voluntary. Participants gave implied informed consent on return of the completed study questionnaire.

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Transparency: The lead author (TB) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and any discrepancies from the study as planned have been explained.

Data sharing statement: No additional data is available at present. Any queries to be submitted to the corresponding author at t.bourne@ic.ac.uk.

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Tables

Table 1. Descriptive statistics by doctor category.

	Consultants N=1481	SAS[a] N=257	Trainees N=1364
Actively practising	1462 (99%)	254 (99%)	1357 (99%)
If actively practising[b]:			
Age, mean (range)	50 (33-73)	47 (27-74)	33 (25-58)
Female	831 (58%)	171 (68%)	1067 (80%)
Ethnicity			
White	831 (57%)	79 (31%)	857 (64%)
Asian	438 (30%)	106 (42%)	288 (21%)
Black	88 (6%)	23 (9%)	90 (7%)
Mixed	58 (4%)	26 (10%)	88 (7%)
Other	37 (3%)	19 (8%)	26 (2%)
Parity	1267 (87%)	198 (78%)	585 (43%)
Relationship	1269 (87%)	216 (85%)	979 (72%)
Qualified in UK/Ireland	865 (59%)	42 (17%)	1089 (80%)
Full time	1276 (87%)	211 (83%)	1064 (79%)
Subspecialty (consultants)			
None	1278 (87%)	N/A	N/A
Maternal/Fetal medicine	56 (4%)	N/A	N/A
Sexual/reproductive health	34 (2%)	N/A	N/A
Gynaecological oncology	33 (2%)	N/A	N/A
Reproductive medicine	33 (2%)	N/A	N/A
Urogynaecology	28 (2%)	N/A	N/A
Maslach Burnout Inventory			
Emotional exhaustion			
Mean	2.2 (0-6)	2.1 (0-5.9)	2.4 (0-6)
High[c] (%)	411 (28%)	65 (26%)	440 (32%)
Depersonalisation			
Mean	0.9 (0-5.8)	0.9 (0-6)	1.4 (0-5.8)
High[d] (%)	178 (12%)	33 (13%)	394 (29%)
Personal accomplishment			
Mean	4.7 (1-6)	4.4 (0.5-6)	4.3 (0-6)
Low[e](%)	382 (26%)	95 (37%)	530 (39%)
Burnout[f]	460 (31%)	76 (30%)	580 (43%)
Defensive medical practice			
Avoidance			
Mean	1.4 (0-12)	1.1 (0-12)	0.9 (0-10)
Elevated[g] (%)	125 (9%)	13 (5%)	58 (4%)
Hedging			
Mean	5.2 (0-36)	2.8 (0-36)	4.6 (0-36)
Elevated[h] (%)	164 (11%)	11 (4%)	114 (8%)
Any defensive medical practice[i]	231 (16%)	20 (8%)	149 (11%)

[a] SAS: Specialty and Specialty Associate Doctors

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[b] Results for each variable are based on available data, i.e. excluding participants with a missing value. Gender has the most missing values, 41/3073 (1.3%). Missing values for all variables are reported in eTable1 in the Supplement.
[c] Scores of ≥27 (range 0-54) are considered high and indicate burnout in accordance with the Maslach Burnout Inventory
[d] Scores of ≥10 (range 0-30) are considered high and indicate burnout in accordance with the Maslach Burnout Inventory
[e] The score range is 0-48; scores ≤33 are defined as low personal accomplishment
[f] Positive for burnout if emotional exhaustion or depersonalisation scores high (as defined) in accordance with the Maslach Burnout Inventory
[g] Scores of ≥13 (range 0-36) are considered elevated and indicate avoidance behaviour
[h] Scores of ≥5 (range 0-12) are considered elevated and indicate hedging behaviour
[i] Defined as elevated levels of avoidance and/or hedging behaviour

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Table 2. Descriptive statistics of Burnout and Defensive Medical Practice stratified by demographic variables.

	Burnout[a] (%)	Avoidance[b] (%)	Hedging[c] (%)	Any DMP[d,e] (%)
Age (years)				
<35 (n=948)	440 (46%)	37 (4%)	93 (10%)	115 (12%)
35-49 (n=1209)	395 (33%)	68 (6%)	114 (9%)	151 (12%)
≥50 (n=916)	281 (31%)	91 (10%)	82 (9%)	134 (15%)
Gender				
Female (n=2069)	763(37%)	105 (5%)	179 (9%)	239 (12%)
Male (n=963)	332 (34%)	87 (9%)	102 (11%)	152 (16%)
Ethnicity				
White (n=1767)	723 (41%)	114 (6%)	159 (9%)	227 (13%)
Asian (n=832)	229 (28%)	49 (6%)	79 (9%)	105 (13%)
Black (n=201)	57 (28%)	10 (5%)	17 (8%)	21 (10%)
Mixed (n=172)	59 (34%)	14 (8%)	23 (13%)	31 (18%)
Other (n=82)	39 (48%)	3 (4%)	7 (9%)	8 (10%)
Parity				
No (n=1023)	473 (46%)	48 (5%)	96 (9%)	126 (12%)
Yes (n=2050)	643 (31%)	148 (7%)	193 (9%)	274 (13%)
Relationship				
No (n=601)	266 (44%)	32 (5%)	51 (8%)	74 (12%)
Yes (n=2464)	844 (34%)	161 (7%)	237 (10%)	323 (13%)
Country of Qualification				
United Kingdom/Ireland (n=1996)	841 (42%)	125 (6%)	193 (10%)	265 (13%)
Other (n=1075)	273 (25%)	71 (7%)	96 (9%)	135 (13%)
Work status				
Full Time (n= 2551)	952 (37%)	161 (6%)	248 (10%)	341 (13%)
Less Than Full Time (n=519)	163 (31%)	35 (7%)	41 (8%)	59 (11%)
Subspecialty (consultants)				
None (n=1278)	404 (32%)	116 (9 %)	151 (12%)	213 (17%)
Maternal/Fetal (n=56)	20 (36%)	3 (5%)	7 (12.5%)	8 (14%)
Sexual/Reproductive health (n=34)	10 (29%)	0 (0%)	1 (3%)	1 (3%)
Gynaecological oncology (n=33)	8 (24%)	0 (0%)	1 (3%)	1 (3%)
Reproductive medicine (n=33)	9 (27%)	2 (6%)	0	2 (6%)
Urogynaecology (n=28)	9 (32%)	4 (14%)	4 (14 %)	6 (21%)

[a] Positive for burnout if emotional exhaustion score ≥27 (range 0-54) or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory

[b] Defined as avoidance score of ≥13 (range 0-36)

[c] Defined as hedging score of ≥5 (range 0-12)

[d] DMP: Defensive Medical Practice

[e] Defined as presence of avoidance and/or hedging (as defined)

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Table 3. Descriptive statistics of defensive practice by burnout status

Doctor category	Avoidance[a]		Hedging[b]		Any DMP[c,d]
Burnout status[e]	**Mean score**	**% Elevated**	**Mean score**	**% Elevated**	**%**
Consultant					
No burnout (n=1002)	1.05	53 (5%)	3.95	67 (7%)	101 (10%)
Burnout (n=460)	2.14	72 (16%)	7.79	97 (21%)	130 (28%)
SAS[f]					
No burnout (n=178)	0.72	3 (2%)	1.74	2 (1%)	5 (3%)
Burnout (n=76)	1.92	10 (13%)	5.34	9 (12%)	15 (20%)
Trainees					
No burnout (n=777)	0.59	15 (2%)	3.30	25 (3%)	36 (5%)
Burnout (n=580)	1.38	43 (7%)	6.46	89 (15%)	113 (19%)
All doctors					
No burnout (n=1957)	0.84	71 (4%)	3.49	94 (5%)	142 (7%)
Burnout (n=1116)	1.73	125 (11%)	6.93	195 (17%)	258 (23%)
Odds ratio[g] (95% CI)		3.34 (2.48-4.53)		4.18 (3.24-5.43)	3.84 (3.08-4.79)

[a] Scores of ≥13 (range 0-36) are considered elevated and indicate avoidance behaviour
[b] Scores of ≥5 (range 0-12) are considered elevated and indicate hedging behaviour
[c] DMP: Defensive Medical Practice
[d] Defined as elevated levels of avoidance and/or hedging behaviour
[e] Burnout defined as an emotional exhaustion score ≥27 (range 0-54) or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[f] SAS: Specialty and Specialty Associate Doctors
[g] Odds ratios are based on univariable logistic regression with Firth bias correction

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Table 4. Descriptive statistics of self-reported wellbeing, and odds ratios (with 95% Confidence Intervals (CI)) with burnout

	All (n=3073)	Consultants (n=1462)	SAS[a] (n=254)	Trainees (n=1357)
Cardiovascular problems	261 (8.5)	186 (12.7)	31 (12.2)	44 (3.2)
No burnout	148 (7.6)	114 (11.4)	20 (11.2)	14 (1.8)
Burnout[b]	113 (10.1)	72 (15.7)	11 (14.5)	30 (5.2)
Odds ratio[c] (95% CI)	1.38 (1.07-1.78)			
Gastro-intestinal problems	480 (15.6)	221 (15.1)	29 (11.4)	230 (16.9)
No burnout	225 (11.5)	111 (11.1)	14 (7.9)	100 (12.9)
Burnout	255 (22.8)	110 (23.9)	15 (19.7)	130 (22.4)
Odds ratio[c] (95% CI)	2.28 (1.87-2.78)			
Depression	416 (13.5)	141 (9.6)	41 (16.1)	234 (17.2)
No burnout	144 (7.4)	42 (4.2)	21 (11.8)	81 (10.4)
Burnout	272 (24.4)	99 (21.5)	20 (26.3)	153 (26.4)
Odds ratio[c] (95% CI)	4.05 (3.26-5.04)			
Anxiety	1008 (32.8)	416 (28.5)	80 (31.5)	512 (37.7)
No burnout	439 (22.4)	194 (19.4)	43 (24.2)	202 (26.0)
Burnout	569 (51.0)	222 (48.3)	37 (48.7)	310 (53.4)
Odds ratio[c] (95% CI)	3.59 (3.07-4.21)			
Anger-irritability	1048 (34.1)	498 (34.1)	81 (31.9)	469 (34.6)
No burnout	465 (23.8)	235 (23.5)	42 (23.6)	188 (24.2)
Burnout	583 (52.2)	263 (57.2)	39 (51.3)	281 (4845)
Odds ratio[c] (95% CI)	3.51 (3.00-4.10)			
Suicidal thoughts	90 (2.9)	33 (2.3)	2 (0.8)	55 (4.1)
No burnout	20 (1.0)	5 (0.5)	0	15 (1.9)
Burnout	70 (6.3)	28 (6.1)	2 (2.6)	40 (6.9)
Odds ratio[c] (95% CI)	6.37 (3.95-10.7)			
Sleep problems / insomnia	1188 (38.7)	515 (35.2)	93 (36.6)	580 (42.7)
No burnout	563 (28.8)	256 (25.5)	52 (29.2)	255 (32.8)
Burnout	625 (56.0)	259 (56.3)	41 (53.9)	325 (56.0)
Odds ratio[c] (95% CI)	3.15 (2.70-3.67)			
Marital/relationship problems	544 (17.7)	206 (14.1)	43 (16.9)	295 (21.7)
No burnout	241 (12.3)	105 (10.5)	20 (11.2)	116 (14.9)
Burnout	303 (27.2)	101 (22.0)	23 (30.3)	179 (30.9)
Odds ratio[c] (95% CI)	2.65 (2.20-3.20)			
Frequent headaches	652 (21.2)	210 (14.4)	77 (30.3)	365 (26.9)
No burnout	317 (16.2)	107 (10.7)	37 (20.8)	173 (22.3)
Burnout	335 (30.0)	103 (22.4)	40 (52.6)	192 (33.1)
Odds ratio[c] (95% CI)	2.22 (1.86-2.64)			
Minor colds	812 (26.4)	268 (18.3)	59 (23.2)	485 (35.7)
No burnout	449 (22.9)	165 (16.5)	42 (23.6)	242 (31.1)
Burnout	363 (32.5)	103 (22.4)	17 (22.4)	243 (41.9)
Odds ratio[c] (95% CI)	1.62 (1.37-1.91)			
Recurrent respiratory infections	188 (6.1)	66 (4.5)	16 (6.3)	106 (7.8)
No burnout	81 (4.1)	31 (3.1)	10 (5.6)	40 (5.1)
Burnout	107 (9.6)	35 (7.6)	6 (7.9)	66 (11.4)
Odds ratio[c] (95% CI)	2.45 (1.82-3.31)			
Alcohol/drugs problems	97 (3.2)	56 (3.8)	4 (1.6)	37 (2.7)
No burnout	40 (2.0)	24 (2.4)	2 (1.1)	14 (1.8)
Burnout	57 (5.1)	32 (7.0)	2 (2.6)	23 (4.0)
Odds ratio[c] (95% CI)	2.57 (1.71-3.89)			

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[a] SAS: Specialty and Specialty Associate Doctors
[b] Burnout defined as an emotional exhaustion score ≥27 (range 0-54) or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[c] Odds ratio based on univariable Firth corrected logistic regression of wellbeing item vs burnout with stratification for group (consultant, SAS, trainee)

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Table 5. Univariable and multivariable logistic regression results (using Firth bias correction).

	Burnout[a]		Any DMP[b]	
Predictor variable	**Crude OR[c]**	**Adjusted OR**	**Crude OR**	**Adjusted OR**
Grade (versus consultants)				
SAS[d]	0.93 (0.70; 1.24)	1.14 (0.83; 1.55)	0.47 (0.28; 0.73)	0.40 (0.23; 0.65)
Trainees	1.63 (1.39; 1.90)	1.00 (0.77; 1.31)	0.66 (0.53; 0.82)	0.47 (0.32; 0.70)
Age (per 5 years)	0.87 (0.84; 0.90)	0.92 (0.87; 0.98)	1.04 (0.99; 1.09)	0.93 (0.85; 1.02)
Female (versus male)	1.12 (0.95; 1.31)	0.97 (0.81; 1.16)	0.70 (0.56; 0.87)	0.70 (0.55; 0.89)
Ethnicity (versus white)				
Asian	0.54 (0.45; 0.65)	0.74 (0.60; 0.91)	0.98 (0.77; 1.25)	1.15 (0.85; 1.54)
Black	0.57 (0.41; 0.78)	0.73 (0.51; 1.02)	0.79 (0.48; 1.24)	0.90 (0.53; 1.47)
Mixed	0.75 (0.54; 1.03)	0.82 (0.58; 1.15)	1.53 (1.01; 2.27)	1.89 (1.21; 2.89)
Other	1.37 (0.88; 2.12)	2.19 (1.37; 3.52)	0.84 (0.40; 1.59)	0.64 (0.29; 1.30)
Parity	0.53 (0.46; 0.62)	0.78 (0.64; 0.97)	1.10 (0.88; 1.38)	1.03 (0.75; 1.41)
Current relationship	0.65 (0.54; 0.78)	0.87 (0.70; 1.07)	1.06 (0.82; 1.40)	1.07 (0.79; 1.46)
Medical Qualification from United Kingdom/Ireland (vs other country)	2.13 (1.81; 2.51)	1.74 (1.41; 2.16)	1.06 (0.85; 1.33)	0.84 (0.63; 1.14)
Full time (vs Less Than Full Time)	1.30 (1.06; 1.59)	1.28 (1.02; 1.62)	1.19 (0.90; 1.61)	0.91 (0.65; 1.27)
Burnout			3.84 (3.08; 4.79)	4.35 (3.46; 5.49)

[a]Burnout defined as an emotional exhaustion score ≥27 (range 0-54) or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory

[b]Defensive medical practice (DMP) defined as elevated levels of avoidance and/or hedging behaviour

[c] OR: Odds Ratio

[d] SAS: Specialty and Specialty Associate Doctors

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Supplementary Online Content

eMethods. Defensive medical practice questionnaire items and factor structure

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eTable 2. Demographic data of trainees in study and Royal College of Obstetricians and Gynaecologists Training Evaluation Form (TEF) 2018 Survey

eTable 3. Spearman correlations between Maslach Burnout Inventory (MBI) and Defensive Medical Practice (DMP) subscales

eTable 4. Descriptive statistics and crude odds ratio of defensive practice according to each Maslach Burnout Inventory subscale

eFigure 1. Scatter plot matrix of Maslach Burnout Inventory and Defensive Medical Practice subscales

eFigure 2. Nomograms of the multivariable logistic regression models for burnout and any Defensive Medical Practice

eDiscussion. Survey response rate amongst trainees

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eMethods. Defensive medical practice questionnaire items and factor structure

For each of the following, respondents were asked to rate each item on a 5-point Likert scale (ranging from never to often).

Avoidance (3 items)

- Avoided a particular type of invasive procedure
- Not accepted "high risk" patients in order to avoid possible complications
- Stopped doing aspects of your job

Hedging (9 items)

- Prescribed more medications than medically indicated
- Referred to specialists in unnecessary circumstances
- Conducted more investigations or made more referrals than warranted by the patient's condition
- Admitted patients to hospital when the patient could have been discharged home safely or managed as an outpatient
- Asked for more frequent observations to be carried out on a patient than necessary
- Written in patients' records specific remarks such as "not suicidal" which you would not if you were not worried about legal/media/disciplinary consequences
- Written more letters about a patient than is necessary to communicate about the patient's condition
- Referred patient for a second opinion more than necessary
- Carried out more tests than necessary

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eTable 1. Missing data among actively practicing participants

	Consultants N=1462	SAS[a] N=254	Trainees N=1357
Age, mean (range)	None missing	None missing	None missing
Gender	19 (1%)	2 (1%)	20 (1%)
Ethnicity	10 (1%)	1 (<1%)	8 (1%)
Parity	None missing	None missing	None missing
Relationship	3 (<1%)	None missing	5 (<1%)
Medical Qualification country of origin	None missing	1 (<1%)	1 (<1%)
Work status (Full Time vs Less Than Full Time)	None missing	1 (<1%)	2 (<1%)
Maslach Burnout Inventory	None missing	None missing	None missing
Defensive practice	None missing	None missing	None missing

[a]SAS: Specialty and Specialty Associate Doctors

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eTable 2. Demographic data of trainees in study and Royal College of Obstetricians and Gynaecologists (RCOG) Training Evaluation Form (TEF) 2018 Survey

	RCOG TEF Database (n=1754) (%)[a]	Trainees (n=1357) (%)
Age		
20-29	497 (28.3%)	336 (24.8%)
30-29	1092 (62.3%)	897 (66.1%)
40-49	106 (6.0%)	115 (8.4%)
50-59	2 (0.1%)	9 (0.7%)
Over 60	0	0
Missing data	57 (3.3%)	0
Female	1387 (79.1%)	1067 (79.8%)
Ethnicity		
White	1108 (63.2%)	857 (63.2%)
Asian	381 (21.7%)	288 (21.2%)
Black	97 (5.5%)	90 (6.6%)
Mixed	83 (4.7%)	88 (6.5%)
Other	68 (3.9%)	26 (1.9%)
Missing data	17 (1%)	8 (0.6%)

[a] RCOG TEF survey sent to 1956 trainees who held a National Training Number and an email address associated with an active ePortfolio at the time of the survey, which is used to assess competencies and training progress. It was responded to by 1754 trainees (89.7% response rate).

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eTable 3. Spearman correlations between Maslach Burnout Inventory and defensive medical practice subscales

	EE[b]	DP[c]	PA[d]	Av[e]	He[f]
MBI[a] – EE	1				
MBI – DP	0.57	1			
MBI – PA	-0.30	-0.34	1		
Av	0.28	0.30	-0.19	1	
He	0.34	0.38	-0.17	0.41	1

[a] MBI: Maslach Burnout Inventory
[b] EE: Emotional Exhaustion
[c] DP: Depersonalization
[d] PA: Personal Accomplishment
[e] Av: Avoidance
[f] He: Hedging

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eTable 4. Descriptive statistics of defensive practice according to each Maslach Burnout Inventory (MBI) subscale

MBI[a] subscales	Avoidance		Hedging		Any DMP[b]
	Mean score	% Elevated	Mean score	% Elevated	%
High emotional exhaustion					
No (n=2157)	0.88	85 (4%)	3.76	125 (6%)	179 (8%)
Yes (n=916)	1.82	111 (12%)	7.05	164 (18%)	221 (24%)
Odds ratio[c] (95% CI)		3.36 (2.51-4.51)		3.54 (2.77-4.54)	3.51 (2.83-4.36)
High depersonalization					
No (n=2468)	0.95	106 (4%)	3.93	159 (6%)	229 (9%)
Yes (n=605)	2.02	90 (15%)	8.06	130 (21%)	171 (28%)
Odds ratio[c] (95% CI)		3.89 (2.89-5.23)		3.97 (3.09-5.11)	3.85 (3.08-4.81)
Low personal accomplishment					
No (n=2066)	0.97	103 (5%)	4.19	142 (7%)	202 (10%)
Yes (n=1007)	1.55	93 (9%)	5.87	147 (15%)	198 (20%)
Odds ratio[c] (95% CI)		1.94 (1.45-2.59)		2.31 (1.81-2.96)	2.26 (1.83-2.79)

[a] MBI: Maslach Burnout Inventory
[b] DMP: Defensive Medical Practice
[c] Odds ratios are based on univariable logistic regression with Firth bias correction.

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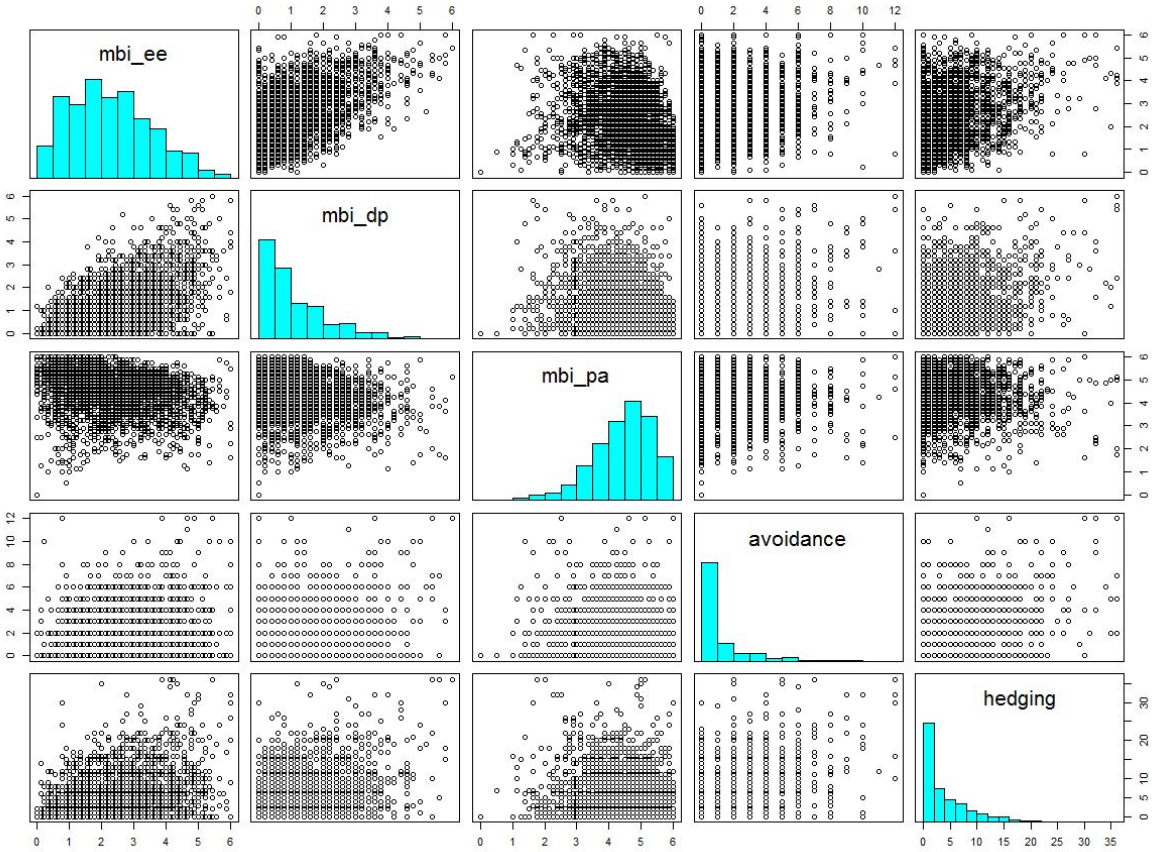
eFigure 1. Scatter plot matrix of Maslach Burnout Inventory and Defensive Medical Practice subscales (with histograms on the diagonal)



The diagonal shows histograms of each subscale. Off-diagonal plots show scatter plots between two subscales.

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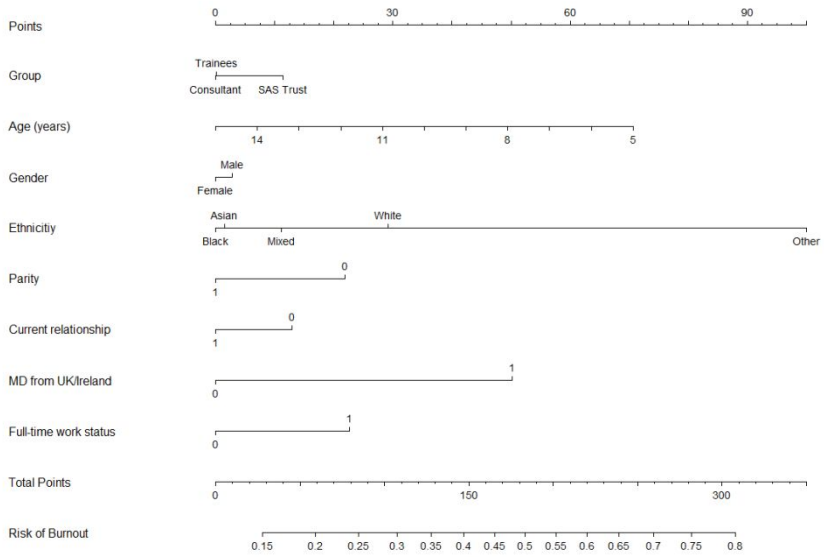
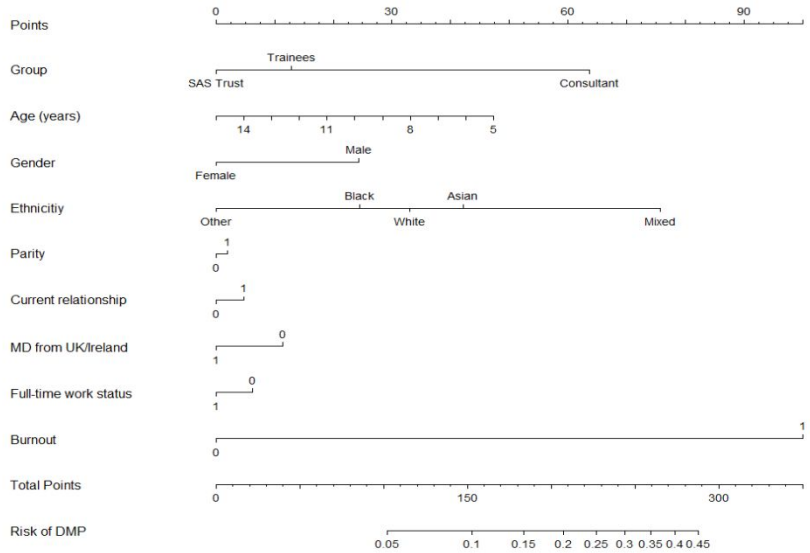
eFigure 2. Nomograms of the multivariable logistic regression models for burnout (A) and any defensive medical practice (B)

A



B



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eDiscussion. Survey response rate amongst trainees

Our survey study was sent to trainees working in Obstetrics and Gynecology in the United Kingdom, registered with the Royal College of Obstetricians and Gynaecologists (RCOG) and identified as trainees on the RCOG main database (n=2375) which is the system from which data is extracted for mailings. This is not however the same list used to distribute the RCOG TEF survey (n=1956, eTable 2 in the Supplement) which is sent to trainees who currently hold a National Training Number and an email address associated with an active ePortfolio, which is used to assess competencies and training progress. In view of this, we believe that a proportion of trainees to whom our survey was sent to (based on being identified as a trainee on the RCOG main database) are likely to have been left on the distribution list, but have in fact subsequently suspended training for a period of time or who are no longer trainees and have not informed the RCOG. These doctors would therefore not have completed the survey. This may account for a proportion of the difference in the numbers of trainees between the mailing list we used and that used for the RCOG TEF survey.

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STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6-7
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	7-8
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	N/A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9-10
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9-10
		(*b*) Describe any methods used to examine subgroups and interactions	9-10
		(*c*) Explain how missing data were addressed	9-10
		(*d*) If applicable, explain how loss to follow-up was addressed	9-10
		(*e*) Describe any sensitivity analyses	9-10
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10-11
		(b) Give reasons for non-participation at each stage	10-11
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10-11
		(b) Indicate number of participants with missing data for each variable of interest	10-11
		(c) Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Report numbers of outcome events or summary measures over time	11

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Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-12
		(*b*) Report category boundaries when continuous variables were categorized	11-12
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11-12
Discussion			
Key results	18	Summarise key results with reference to study objectives	13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14
Generalisability	21	Discuss the generalisability (external validity) of the study results	13-16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

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Burnout, Wellbeing and Defensive Medical Practice amongst Obstetricians and Gynaecologists in the United Kingdom: cross-sectional survey study

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Burnout, Wellbeing and Defensive Medical Practice amongst Obstetricians and Gynaecologists in the United Kingdom: Cross-sectional survey study

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Abstract

Objectives: To determine the prevalence of burnout in doctors practising obstetrics and gynaecology, and assess the association with defensive medical practice and self-reported wellbeing.

Design: Nationwide online cross-sectional survey study; December 2017-March 2018.

Setting: Hospitals in the United Kingdom

Participants: 5661 practising Obstetrics and Gynaecology consultants, specialty and associate specialist doctors and trainees registered with the Royal College of Obstetricians and Gynaecologists

Primary and Secondary Outcome Measures: Prevalence of burnout using the Maslach Burnout Inventory and defensive medical practice (avoiding cases or procedures, overprescribing, over-referral) using a 12-item questionnaire. The odds ratios of burnout with defensive medical practice and self-reported wellbeing.

Results: 3102/5661 doctors (55%) completed the survey. 3073/3102 (99%) met the inclusion criteria (1462 consultants, 1357 trainees and 254 specialty and associate specialist doctors). 1116/3073 (36%) doctors met the burnout criteria, with levels highest amongst trainees (580/1357 [43%]). 258/1116 (23%) doctors with burnout reported increased defensive practice compared to 142/1957 (7%) without (adjusted odds ratio 4.35, 95% CI 3.46 to 5.49). Odds ratios of burnout with wellbeing items varied between 1.38 and 6.37, and were highest for anxiety (3.59, 95% CI 3.07 to 4.21), depression (4.05, 95% CI 3.26 to 5.04), and suicidal thoughts (6.37, 95% CI 95% CI 3.95 to 10.7). In multivariable logistic regression, being of younger age, white or 'other' ethnicity, and graduating with a medical degree from the UK or Ireland had the strongest associations with burnout.

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Conclusions: High levels of burnout were observed in obstetricians and gynaecologists and particularly amongst trainees. Burnout was associated with both increased defensive medical practice and worse doctor wellbeing. These findings have implications for the wellbeing and retention of doctors as well as the quality of patient care, and may help to inform the content of future interventions aimed at preventing burnout and improving patient safety.

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Article Summary - Strengths and limitations of this study

- First nationwide survey in the United Kingdom which examines the prevalence of burnout as well as its relationship to defensive medical practice and self-reported wellbeing
- This study includes a large number of doctors working in obstetrics and gynaecology and has a good response rate
- Use of the Maslach Burnout Inventory, a widely available and validated tool for measuring burnout amongst doctors allows for comparison with other research in this field
- The study is limited by the fact that it is cross-sectional in design which introduces the possibility of selection bias; this must be considered when interpreting the findings

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Introduction

Doctor burnout and mental wellbeing is an important concern internationally(1-5) because of the high reported prevalence(6) and serious consequences for both staff and patients.(7) Burnout syndrome, which is a response to prolonged exposure to occupational stress, is characterised by three dimensions: emotional exhaustion, depersonalisation and reduced personal accomplishment.(8) International studies have shown that burnout is nearly twice as common amongst doctors compared with other healthcare workers.(7) A recent survey by the General Medical Council reported that 24% of trainees and 21% of trainers from across the United Kingdom (UK) described 'feeling burnt out' based on self-reported symptoms.(9) The consequences of burnout amongst doctors have been investigated primarily in the United States (USA)(10) with relatively few large studies conducted in Europe(11-16) and Asia(17, 18) to validate these findings internationally. These include a negative impact on health including higher rates of substance abuse, depression, suicide and a poorer quality of life.(19, 20) Moreover, burnout in doctors has a significant impact on the productivity of healthcare organisations, intentions to leave medical practice, and both the quality and safety of patient care.(21-25) At present, it is unclear if these findings and the proposed interventions can be extrapolated to the United Kingdom (UK) due to a paucity of data on doctor burnout in this setting.(26, 27)

Evidence from studies in Europe(15, 28) and the USA(2) suggest that burnout may be experienced by up to half of doctors in obstetrics and gynaecology (O&G),(29, 30) and that the prevalence of burnout in O&G is one of the highest of any specialty. This may be related to the high-acuity and rapid turnover of patients associated with O&G (31). Burnout is also associated with increased job turnover and reduced workforce retention.(32, 33) Furthermore, a key consequence of doctor burnout is the impact on patient care. A recent meta-analysis suggested burnt out doctors are twice as likely to be involved in patient safety

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incidents and deliver a lower quality of patient care.(34) This is a significant issue in O&G, a specialty already associated with high levels of litigation(35) with obstetric claim settlements costing the NHS over £500 million annually.(36) These high litigation rates are partly attributable to the large number of safety incidents and complaints(37, 38) and a parallel culture of intolerance when errors are made. The overall impact of this 'complaints culture' on doctors is substantial.(39) A UK wide study on the impact of complaints on doctor welfare demonstrated that they are associated with an increased risk of depression, anxiety and suicidal ideation as well as increased defensive practice.(40-42) Defensive medical practice (DMP) is defined as a doctor's deviation from standard practice in response to complaints or criticism(43) which can potentially harm patients as a result of either over-investigation and treatment or because clinicians avoid involvement in difficult cases.(35) A small study of DMP among UK doctors demonstrated that 26.4% of O&G doctors report practising some form of defensive medicine(35, 43). Although the overall effect and cost of the practice of defensive medicine has not been established in the UK, it is thought to represent a highly significant strain on healthcare resources and in the USA, it is estimated to cost $46 billion annually.(44)

There has been great focus by the UK government through initiatives such as 'The Maternal and Neonatal Health Safety Collaborative'(45) to implement strategies which aim to improve maternity safety and outcomes. A facet of this work involves 'understanding the culture' of the O&G workforce.(45) However, to our knowledge, there is currently no quantitative data relating to burnout amongst doctors working in O&G in the UK to inform policy and potential interventions in relation to NHS workforce sustainability (46) as well as any impacts on the quality of patient care (6). Thus, there is a clear need to identify the prevalence and factors associated with burnout amongst doctors. We conducted a nationwide cross-sectional survey study to assess burnout, defensive medical practice and

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associated personal and work factors in O&G doctors in the UK. The aims were firstly to ascertain the prevalence of burnout in the cohort, secondly to determine the levels of DMP and doctor wellbeing and explore their relationship with burnout. Finally, we aimed to explore the relationships between age, gender, ethnicity, doctor seniority, and both burnout and DMP.

Methods

All consultants (equivalent to an attending physician in the USA), specialty and specialty associate (SAS) doctors (doctors who have completed specialist training but do not have a staff position) and trainees (equivalent to a resident or fellow in the USA) working in Obstetrics and Gynaecology in the United Kingdom and registered with the Royal College of Obstetricians and Gynaecologists (RCOG) were invited to participate in this study between December 2017 and March 2018. Registration with the RCOG is mandatory. Doctors were sent an email containing information describing the study and a link to an encrypted online questionnaire. We made it clear to the participants in the invitation email that their participation was voluntary and that responses would be both anonymous and untraceable. Informed consent was implied upon return of the survey. Unique surveys were created for each of the grades described and sent as part of the annual RCOG Workforce and Welfare survey that collects data about doctors' clinical practice and working patterns. During the survey period, 4 reminders were sent out. All actively practising doctors were included as well as doctors who were on sick leave, maternity leave, or suspended from practice. Exclusion criteria included doctors who are fully retired, on a career break, in between jobs, not working in the UK at the time of the survey or those who are currently not employed.

The Survey

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We used a cross-sectional survey design with three participant groups: consultants, SAS doctors and trainees. We estimate that the time taken to complete the questionnaire was 20 minutes.

All participants were asked to provide information on demographic variables, including age, gender, ethnicity (Office of National Statistics classification(47)), relationship status and if they have children. In addition, they were asked about some job and organisational factors such as rota design and career or retirement plans which were tailored to the participant group. These parameters were chosen based on previous studies suggesting that they have an association with burnout.(48) The main outcomes and measures – the Maslach Burnout Inventory Human Services Survey for Medical Personnel(49) (MBI), defensive medical practice questionnaire and questions concerning wellbeing were the same for all groups. A copy of the survey (excluding the copyright restricted MBI) can be found in eMethods in the Supplement.

Main Outcomes and Measures

Symptoms of Burnout

We measured burnout using the Maslach Burnout Inventory Human Services Survey for Medical Personnel(49) (MBI), a validated 22-item tool to identify and characterise burnout. The MBI has three subscales to evaluate the 3 domains of burnout: emotional exhaustion (EE), depersonalisation (DP), and low personal accomplishment (PA). As in previous studies and according to convention,(10, 48, 49) burnout was defined as high EE (scores of 27 or greater; possible score range from 0-54), and/or high DP (scores of 10 or greater; possible score range from 0-30) as opposed to a total score. The PA score was also measured with low PA defined as scores of 33 or lower (possible score range from 0-48) but this was not used as a criterion for burnout in line with previous published work on the subject.(48)

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Defensive Medical Practice

DMP was assessed using a 12-item questionnaire which has previously been developed and described.(40, 42) Items are measured on a 5-point Likert scale (ranging from never to often). Nine items quantify 'hedging' behaviour, which is when doctors are overcautious, leading to overprescribing or over-investigation. 3 items quantify 'avoidance' behaviour, which includes not taking on complicated patients and avoiding certain procedures or more difficult cases. We confirm this factor structure in eMethods in the Supplement. Consistent with previous work, we defined elevated hedging behaviour as a score of 13 or more (possible score range from 0-36), and elevated avoidance behaviour as a score of 5 or more (possible score range from 0-12).(40) We defined any DMP as having elevated levels of avoidance and/or hedging.

Doctor Wellbeing

Doctors were asked to self-report on the presence or absence (yes or no) of a variety of common medical symptoms and conditions including, cardiovascular problems, gastro-intestinal problems, headaches, minor colds, recurring respiratory infections, depression, anxiety, anger and irritability, suicidal thoughts, sleep problems, relationship problems, and alcohol/drug misuse.

Statistical Analyses

Spearman correlations between the MBI and DMP subscales and DMP were calculated. In order to investigate the association between burnout, DMP, and wellbeing, we calculated odds ratios based on univariable logistic regression with Firth bias correction. Multivariable logistic regression with Firth bias correction was used to investigate the association between demographic variables and burnout, with results reported as adjusted

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odds ratios and visualised with a nomogram. The predictors of burnout in this analysis were age, gender, ethnicity, grade, having children, current relationship, medical degree (MD) origin (UK or Ireland vs. other), and work status (full time vs. less than full time). A similar multivariable analysis was performed with DMP as the dependent variable. For this model, the same predictors were used, with burnout added as an additional predictor.

For the logistic regression analyses, missing values were singly imputed using the method of fully conditional specification based on the abovementioned list of predictors, the MBI subscales (as numerical scores), and the DMP subscales (as numerical scores).

R version 3.5.0 was used for the statistical analysis.

Patient and Public Involvement

This research was designed and conducted without patient and public involvement.

Results

Respondent Characteristics

The survey was sent to a total of 5661 doctors. The overall response rate was 54.8% (3102/5661). We received questionnaires from 1481 consultants (53% of 2786 consultants contacted), 1364 trainees (57% of 2375 trainees contacted), and 257 SAS doctors (51% of 500 contacted). Of these, 1462 consultants, 1357 trainees, and 254 SAS doctors were actively practising and included in the analysis. The mean age was 50 years for consultants, 33 years for trainees, and 47 years for SAS doctors (Table 1). A majority of doctors were female (58% of the consultants, 80% of the trainees, 68% of the SAS doctors). Consultants (57%) and trainees (64%) were predominantly white, whereas SAS doctors were most often of Asian ethnicity (42%). Descriptive statistics by demographic variables are presented in Table 2. Information on missing data is presented in eTable 1 in the Supplement.

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We were unable to reliably check if our sample for all doctors was representative of the entire population to whom the study survey was sent with regards to age, gender and ethnicity as the RCOG do not a hold a centralised database of these variables for all doctors against which to compare our data. However, the RCOG sent a different survey (Training Evaluation Form (TEF)) to 1956 trainees in January 2018, which was responded to by 1754 trainees (89.7%) (eTable 2 in the Supplement).(50) When comparing our data to this survey, we found that our trainee sample was comparable in terms of gender (79.1% females in the TEF database compared to 79.8% in our cohort). Furthermore our study population had similar numbers of trainees in the 20-29 and 30-39 age ranges (28.3% and 62.3% respectively in the TEF database compared to 24.8% and 66.1% respectively in our database). Our trainee cohort consisted of more doctors in the 40-59 age range (9.1% compared to 6.1% in the TEF database) which may be accounted for by missing data in the TEF database. In terms of ethnicity, our sample was also comparable for all groups.

Burnout

Regarding the MBI, the percentage of participants meeting the criteria for burnout was 36% overall (1116/3073); 31% for consultants (460/1462), 43% for trainees (580/1364), and 30% for SAS doctors (76/254) (Table 1 and eFigure 1 in the Supplement). Between 26% and 32% met the criteria for high EE, between 12% and 29% met the criteria for high DP, and between 26% and 39% met the criteria for low PA. The EE and DP scales had a Spearman correlation of 0.57, whereas both subscales correlated negatively with PA (-0.30 and -0.34, respectively) (eTable 3).

Defensive Medical Practice

Increased DMP, according to our criteria, was observed in 13% overall (400/3073); 16% of consultants (231/1462), 11% of trainees (149/1364), and 8% of SAS doctors (20/254).

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Between 4% and 9% met our criteria for increased avoidance, and between 4% and 11% met our criteria for increased hedging. These subscales had a Spearman correlation of 0.41 (eTable 3 and eFigure 1 in the Supplement).

Of all participants who met the criteria for burnout, 23% met the criteria for increased DMP (258/1116) (Table 3). Of participants who did not meet the criteria for burnout, 7% reported increased DMP (142/1957). The crude odds ratio (OR) was 3.84 (95% CI 3.08 to 4.79). The relationship was similar for all categories of doctors, and was observed for avoidance as well as hedging behaviour (Table 3 and eTable 4 in the supplement).

Doctor Wellbeing

Doctors with burnout had a higher prevalence of self-reported medical illness (Table 4). Highest odds ratios were observed for suicidal thoughts (6.37, 95% CI 3.95 to 10.7), depression (4.05, 95% CI 3.26 to 5.04), anxiety (3.59, 95% CI 3.07 to 4.21), anger/irritability (3.51, 95% CI 3.00 to 4.10), sleep problems or insomnia (3.15, 95% CI 2.70 to 3.67) and substance misuse (2.57, 95% CI 1.71-3.89). 13.5% (n=416) of all doctors reported depression, but this was 7.4% for doctors without burnout and 24.4% for doctors with burnout. Furthermore, 2.9% (n=90) of all doctors reported suicidal thoughts, 1.0% among doctors without and 6.3% among doctors with burnout. The OR was lowest for cardiovascular problems (1.38, 95% CI 1.07 to 1.78).

Risk factors and correlates

Results of the multivariable models are presented in Table 5 and eFigure 2 in the Supplement. Age, ethnicity, and origin of MD degree were most strongly related to burnout. The older the doctor, the lower the reported level of burnout (adjusted OR per 5 years 0.92, 95% CI 0.87-0.98) and doctors of white and 'other' ethnicity reported higher levels of

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burnout (41% and 48% respectively) than doctors of other ethnicities (28 to 34%). Doctors with a medical degree from the UK or Ireland also reported higher levels of burnout (42% vs 25%, adjusted OR 1.74, 95% CI 1.41 to 2.16).

Regarding any DMP, burnout was the strongest predictor, followed by age, type of doctor, and ethnicity. The adjusted OR of burnout to predict increased DMP was 4.35 (95% CI 3.46 to 5.49). Consultants, doctors of mixed ethnicity, and to a lesser extent older doctors, reported the highest levels of DMP.

Discussion

In this large nationwide study, we have shown that just under half of trainees and a third of consultants and SAS doctors working in obstetrics and gynaecology in the UK suffer from burnout using the MBI scoring system. Furthermore, our data suggest that burnout is associated with higher levels of defensive medical practice, and with poorer mental and physical wellbeing.

The overall prevalence of burnout in this study is consistent with smaller international studies conducted within obstetrics and gynaecology (28, 29, 51) but lower than reported in the United States. (2, 52, 53) This may be explained by differences in the way burnout has been measured, the small number of subjects included in some studies, differences in healthcare systems as well as medical training, and the hours of work in the UK which are restricted by the European Working Time Directive. A lack of personal accomplishment and emotional exhaustion were the most commonly endorsed subscales, followed by depersonalisation. The particularly high levels of burnout amongst younger doctors, of whom the majority are trainees, may provide insights into a recent RCOG national training and workforce report.(54) In this, nine out of ten O&G trainees reported feeling low in

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mood, depressed or anxious since starting specialty training(54). In keeping with this finding, and with a number of American studies,(48, 55) our data indicates that burnout is associated with a negative impact on doctor wellbeing and is strongly associated with depression, anxiety and suicidal thoughts.

Our study reported a particularly strong relationship between burnout and suicidal thoughts; worryingly, suicidal ideation has been shown to be strongly associated with actual suicide attempts and death (56). Furthermore, suicide rates in doctors are known to be much higher than for the general population(57). A study of surgeons in the USA (58) found the prevalence of suicidal ideation in this group to be 6.3%; although this is higher than the prevalence in this study (2.9%), we found the association between burnout and suicidal ideation to be higher (odds ratio, 6.37 versus 1.910 (58)) in our cohort. This may reflect a vulnerability amongst doctors working in O&G compared to other specialties(28, 29) or the differences in healthcare services and culture internationally.

Studies in the USA have indicated an association between burnout and increased workforce turnover(59) which has both financial implications and an impact on healthcare organisation productivity. The RCOG national workforce report(54) has reported that three quarters of trainees have considered leaving O&G practice. In our study, as well as the highest prevalence of burnout amongst trainees, almost a fifth of trainees reported depression and over a third reported anxiety. These symptoms were markedly more prevalent in the cohort with burnout and depression has been shown to be independently associated with an increased self-reported likelihood of leaving practice amongst surgeons.(60) Better understanding the relationship between burnout, wellbeing and staff turnover intentions is of great importance to ensure retention of the workforce going forward. This knowledge will also help to inform the content of interventions aimed at identifying and preventing

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burnout, and improving the wellbeing and retention of doctors early in their careers (61). The majority of interventions proposed to date have been individual-focused strategies which include mindfulness(62), personal coping strategies and exercise (63), or some combination of these. However, a recent meta-analysis of interventions to reduce doctor burnout found that organisation-directed interventions (such as reducing workload, changing rota/shift patterns, or group sessions to enhance teamwork) had a more significant effect on reducing burnout than individual approaches alone(23). This highlights the importance of implementing organisational strategies(64, 65) along with continual assessment of burnout, to develop a healthy workplace environment to effectively tackle this problem(5).

Our finding that burnout is associated with increased DMP supports the concern that doctor burnout impacts the quality of patient care.(34) In 2010, Shanafelt et al. al(19) showed that burnout is an independent predictor of self-reported perceived major medical errors. Our study shows that consultants with burnout are three times more likely to report both avoidance (avoiding cases or procedures) and hedging (overprescribing or over-referral) which may have significant and serious consequences on patient care. This may be because consultants are less 'protected' than trainees in terms of litigation as they take ultimate responsibility for a patient's care. Furthermore, due to their seniority, they are likely to have experienced more complaints or adverse events during their careers, which have been shown to be associated with DMP(42). The observation in our study that age is inversely associated with burnout is also in keeping with other studies.(66) This may be explained by the fact that doctors who remain within the specialty are inherently more resilient, and that those more affected by burnout may be accounted for in the attrition rate from the specialty(67). It has also been suggested that the lower rate of burnout seen in more senior doctors is because they may have a better work-life balance and career (67, 68). A further

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noteworthy association in our cohort was that after controlling for other confounding variables, doctors from ethnic minorities were less likely to experience burnout. Similar findings have been reported in studies of trainees and medical students in the USA(69-71) however the reasons for this are unknown. It has been proposed that that these differences may be explained by differences in upbringing and life stressors, which may make doctors from ethnic minorities more resilient(69). Consistent with this, we found that doctors who graduated in the UK or Ireland are almost twice as likely to experience burnout.

Strengths and weaknesses of our study are important to consider in contrast with other research on the prevalence of burnout in doctors. A strength of the study is that it is a nationwide survey which includes a large number of doctors and is the first study to our knowledge that seeks to explore the relationship between burnout (using a validated tool, the MBI) and defensive medical practice. There were several limitations to the present study. Firstly, although the overall response rate was only 54.8% which is a relatively high response rate for a survey study of this type, it still introduces the possibility of selection bias, which must be considered when interpreting the findings. We believe however that the response rate quoted is the minimum rate and is likely to under-report the response rate from practising clinicians (eDiscussion in the Supplement). Secondly, it is plausible that individuals most affected by burnout may have avoided engaging with the survey and conversely those least impacted may not have seen its value which could bias the results. Thirdly, we asked doctors to self-report on medical conditions including depression and anxiety and the questionnaire used to assess DMP, although used in previous studies (40-42), has not been formally validated. Finally, a limitation of a cross-sectional survey study is that it cannot take into account variability of symptoms over time, which may be influenced by other factors such as time of the year and other personal factors.

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Conclusions

Our nationwide study reports high levels of burnout amongst obstetricians and gynaecologists in the UK, and that burnout is more prevalent in younger doctors who have trained in the UK. Furthermore, our data suggest that burnout is strongly associated with anxiety, depression, suicidal thoughts and substance misuse. This highlights the impact of burnout on the efficiency and sustainability of the O&G medical workforce, which confirms the need to regularly assess and mitigate burnout in doctors. We have also observed an association between burnout and defensive medical practice, which has implications for the quality and safety of patient care being delivered as well as the wellbeing and retention of staff in the NHS. Ultimately, cultivating a greater understanding of doctor burnout and its implications has strategic importance for the sustainability of the NHS workforce and will add to the body of evidence required to improve productivity and patient safety outcomes more broadly across the UK.

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Footnotes

Author Contributions: TB had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: TB, CL, AW, LR

Acquisition, analysis, and interpretation of data: TB, HS, NF, DT, CL, AW, MAL, LR, BVC

Drafting of the manuscript: TB, HS, BVC

Critical revision of the manuscript for important intellectual content: TB, HS, NF, DT, CL, AW, MAL, LR, BVC

Statistical analysis: NF, BVC

Obtained funding: TB

TB is the guarantor and attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the

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submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Ethical Approval: The survey was sent to doctors registered with the Royal College of Obstetricians and Gynaecologists via their email database. The Chair of the RCOG Ethics Committee (Vivienne Nathanson) reviewed the study proposal and confirmed that ethical approval was not required. This was due to the fact that the data collected about doctors was via an encrypted online questionnaire and participants were informed that their participation was voluntary and that responses would be both anonymous and untraceable. Informed consent was implied on return of the survey.

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Transparency: The lead author (TB) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and any discrepancies from the study as planned have been explained.

Data sharing statement: No additional data is available at present. Any queries to be submitted to the corresponding author at t.bourne@imperial.ac.uk.

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Tables

Table 1. Descriptive statistics by doctor category.

	Consultants N=1481	**SAS[a] N=257**	**Trainees N=1364**
Actively practising	1462 (99%)	254 (99%)	1357 (99%)
If actively practising[b]:			
Age, mean (range)	50 (33-73)	47 (27-74)	33 (25-58)
Female	831 (58%)	171 (68%)	1067 (80%)
Ethnicity			
White	831 (57%)	79 (31%)	857 (64%)
Asian	438 (30%)	106 (42%)	288 (21%)
Black	88 (6%)	23 (9%)	90 (7%)
Mixed	58 (4%)	26 (10%)	88 (7%)
Other	37 (3%)	19 (8%)	26 (2%)
Children	1267 (87%)	198 (78%)	585 (43%)
Relationship	1269 (87%)	216 (85%)	979 (72%)
Qualified in UK/Ireland	865 (59%)	42 (17%)	1089 (80%)
Full time	1276 (87%)	211 (83%)	1064 (79%)
Subspecialty (consultants)			
None	1278 (87%)	N/A	N/A
Maternal/Fetal medicine	56 (4%)	N/A	N/A
Sexual/reproductive health	34 (2%)	N/A	N/A
Gynaecological oncology	33 (2%)	N/A	N/A
Reproductive medicine	33 (2%)	N/A	N/A
Urogynaecology	28 (2%)	N/A	N/A
Maslach Burnout Inventory			
Emotional exhaustion			
Mean	19.9 (0-54)	18.7 (0-53)	21.9 (0-54)
High[c] (%)	411 (28%)	65 (26%)	440 (32%)
Depersonalisation			
Mean	4.5 (0-29)	4.5 (0-30)	7.0 (0-29)
High[d] (%)	178 (12%)	33 (13%)	394 (29%)
Personal accomplishment			
Mean	37.2 (0-48)	35.3 (4-48)	34.6 (0-48)
Low[e](%)	382 (26%)	95 (37%)	530 (39%)
Burnout[f]	460 (31%)	76 (30%)	580 (43%)
Defensive medical practice			
Avoidance			
Mean	1.4 (0-12)	1.1 (0-12)	0.9 (0-10)
Elevated[g] (%)	125 (9%)	13 (5%)	58 (4%)
Hedging			
Mean	5.2 (0-36)	2.8 (0-36)	4.6 (0-36)
Elevated[h] (%)	164 (11%)	11 (4%)	114 (8%)
Any defensive medical practice[i]	231 (16%)	20 (8%)	149 (11%)

[a] SAS: Specialty and Specialty Associate Doctors

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[b] Results for each variable are based on available data, i.e. excluding participants with a missing value. Gender has the most missing values, 41/3073 (1.3%). Missing values for all variables are reported in eTable1 in the Supplement.
[c] Scores of ≥27 (range 0-54) are considered high and indicate burnout in accordance with the Maslach Burnout Inventory
[d] Scores of ≥10 (range 0-30) are considered high and indicate burnout in accordance with the Maslach Burnout Inventory
[e] The score range is 0-48; scores ≤33 are defined as low personal accomplishment
[f] Positive for burnout if emotional exhaustion and/or depersonalisation scores high (as defined) in accordance with the Maslach Burnout Inventory
[g] Scores of ≥13 (range 0-36) are considered elevated and indicate avoidance behaviour
[h] Scores of ≥5 (range 0-12) are considered elevated and indicate hedging behaviour
[i] Defined as elevated levels of avoidance and/or hedging behaviour

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Table 2. Descriptive statistics of Burnout and Defensive Medical Practice stratified by demographic variables.

	Burnout[a] (%)	Avoidance[b] (%)	Hedging[c] (%)	Any DMP[d,e] (%)
Age (years)				
<35 (n=948)	440 (46%)	37 (4%)	93 (10%)	115 (12%)
35-49 (n=1209)	395 (33%)	68 (6%)	114 (9%)	151 (12%)
≥50 (n=916)	281 (31%)	91 (10%)	82 (9%)	134 (15%)
Gender				
Female (n=2069)	763(37%)	105 (5%)	179 (9%)	239 (12%)
Male (n=963)	332 (34%)	87 (9%)	102 (11%)	152 (16%)
Ethnicity				
White (n=1767)	723 (41%)	114 (6%)	159 (9%)	227 (13%)
Asian (n=832)	229 (28%)	49 (6%)	79 (9%)	105 (13%)
Black (n=201)	57 (28%)	10 (5%)	17 (8%)	21 (10%)
Mixed (n=172)	59 (34%)	14 (8%)	23 (13%)	31 (18%)
Other (n=82)	39 (48%)	3 (4%)	7 (9%)	8 (10%)
Children				
No (n=1023)	473 (46%)	48 (5%)	96 (9%)	126 (12%)
Yes (n=2050)	643 (31%)	148 (7%)	193 (9%)	274 (13%)
Relationship				
No (n=601)	266 (44%)	32 (5%)	51 (8%)	74 (12%)
Yes (n=2464)	844 (34%)	161 (7%)	237 (10%)	323 (13%)
Country of Qualification				
United Kingdom/Ireland (n=1996)	841 (42%)	125 (6%)	193 (10%)	265 (13%)
Other (n=1075)	273 (25%)	71 (7%)	96 (9%)	135 (13%)
Work status				
Full Time (n= 2551)	952 (37%)	161 (6%)	248 (10%)	341 (13%)
Less Than Full Time (n=519)	163 (31%)	35 (7%)	41 (8%)	59 (11%)
Subspecialty (consultants)				
None (n=1278)	404 (32%)	116 (9 %)	151 (12%)	213 (17%)
Maternal/Fetal (n=56)	20 (36%)	3 (5%)	7 (12.5%)	8 (14%)
Sexual/Reproductive health (n=34)	10 (29%)	0 (0%)	1 (3%)	1 (3%)
Gynaecological oncology (n=33)	8 (24%)	0 (0%)	1 (3%)	1 (3%)
Reproductive medicine (n=33)	9 (27%)	2 (6%)	0	2 (6%)
Urogynaecology (n=28)	9 (32%)	4 (14%)	4 (14 %)	6 (21%)

[a] Positive for burnout if emotional exhaustion score ≥27 (range 0-54) and/or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[b] Defined as avoidance score of ≥13 (range 0-36)
[c] Defined as hedging score of ≥5 (range 0-12)
[d] DMP: Defensive Medical Practice
[e] Defined as presence of avoidance and/or hedging (as defined)

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Table 3. Descriptive statistics of defensive practice by burnout status

Doctor category	Avoidance[a]		Hedging[b]		Any DMP[c,d]
Burnout status[e]	**Mean score**	**% Elevated**	**Mean score**	**% Elevated**	**%**
Consultant					
No burnout (n=1002)	1.05	53 (5%)	3.95	67 (7%)	101 (10%)
Burnout (n=460)	2.14	72 (16%)	7.79	97 (21%)	130 (28%)
SAS[f]					
No burnout (n=178)	0.72	3 (2%)	1.74	2 (1%)	5 (3%)
Burnout (n=76)	1.92	10 (13%)	5.34	9 (12%)	15 (20%)
Trainees					
No burnout (n=777)	0.59	15 (2%)	3.30	25 (3%)	36 (5%)
Burnout (n=580)	1.38	43 (7%)	6.46	89 (15%)	113 (19%)
All doctors					
No burnout (n=1957)	0.84	71 (4%)	3.49	94 (5%)	142 (7%)
Burnout (n=1116)	1.73	125 (11%)	6.93	195 (17%)	258 (23%)
Odds ratio[g] (95% CI)		3.34 (2.48-4.53)		4.18 (3.24-5.43)	3.84 (3.08-4.79)

[a] Scores of ≥13 (range 0-36) are considered elevated and indicate avoidance behaviour
[b] Scores of ≥5 (range 0-12) are considered elevated and indicate hedging behaviour
[c] DMP: Defensive Medical Practice
[d] Defined as elevated levels of avoidance and/or hedging behaviour
[e] Burnout defined as an emotional exhaustion score ≥27 (range 0-54) and/or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[f] SAS: Specialty and Specialty Associate Doctors
[g] Odds ratios are based on univariable logistic regression with Firth bias correction

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Table 4. Descriptive statistics of self-reported wellbeing, and odds ratios (with 95% Confidence Intervals (CI)) with burnout

	All (n=3073)	Consultants (n=1462)	SAS[a] (n=254)	Trainees (n=1357)
Cardiovascular problems	261 (8.5)	186 (12.7)	31 (12.2)	44 (3.2)
No burnout	148 (7.6)	114 (11.4)	20 (11.2)	14 (1.8)
Burnout[b]	113 (10.1)	72 (15.7)	11 (14.5)	30 (5.2)
Odds ratio[c] (95% CI)	1.38 (1.07-1.78)			
Gastro-intestinal problems	480 (15.6)	221 (15.1)	29 (11.4)	230 (16.9)
No burnout	225 (11.5)	111 (11.1)	14 (7.9)	100 (12.9)
Burnout	255 (22.8)	110 (23.9)	15 (19.7)	130 (22.4)
Odds ratio[c] (95% CI)	2.28 (1.87-2.78)			
Depression	416 (13.5)	141 (9.6)	41 (16.1)	234 (17.2)
No burnout	144 (7.4)	42 (4.2)	21 (11.8)	81 (10.4)
Burnout	272 (24.4)	99 (21.5)	20 (26.3)	153 (26.4)
Odds ratio[c] (95% CI)	4.05 (3.26-5.04)			
Anxiety	1008 (32.8)	416 (28.5)	80 (31.5)	512 (37.7)
No burnout	439 (22.4)	194 (19.4)	43 (24.2)	202 (26.0)
Burnout	569 (51.0)	222 (48.3)	37 (48.7)	310 (53.4)
Odds ratio[c] (95% CI)	3.59 (3.07-4.21)			
Anger-irritability	1048 (34.1)	498 (34.1)	81 (31.9)	469 (34.6)
No burnout	465 (23.8)	235 (23.5)	42 (23.6)	188 (24.2)
Burnout	583 (52.2)	263 (57.2)	39 (51.3)	281 (4845)
Odds ratio[c] (95% CI)	3.51 (3.00-4.10)			
Suicidal thoughts	90 (2.9)	33 (2.3)	2 (0.8)	55 (4.1)
No burnout	20 (1.0)	5 (0.5)	0	15 (1.9)
Burnout	70 (6.3)	28 (6.1)	2 (2.6)	40 (6.9)
Odds ratio[c] (95% CI)	6.37 (3.95-10.7)			
Sleep problems / insomnia	1188 (38.7)	515 (35.2)	93 (36.6)	580 (42.7)
No burnout	563 (28.8)	256 (25.5)	52 (29.2)	255 (32.8)
Burnout	625 (56.0)	259 (56.3)	41 (53.9)	325 (56.0)
Odds ratio[c] (95% CI)	3.15 (2.70-3.67)			
Marital/relationship problems	544 (17.7)	206 (14.1)	43 (16.9)	295 (21.7)
No burnout	241 (12.3)	105 (10.5)	20 (11.2)	116 (14.9)
Burnout	303 (27.2)	101 (22.0)	23 (30.3)	179 (30.9)
Odds ratio[c] (95% CI)	2.65 (2.20-3.20)			
Frequent headaches	652 (21.2)	210 (14.4)	77 (30.3)	365 (26.9)
No burnout	317 (16.2)	107 (10.7)	37 (20.8)	173 (22.3)
Burnout	335 (30.0)	103 (22.4)	40 (52.6)	192 (33.1)
Odds ratio[c] (95% CI)	2.22 (1.86-2.64)			
Minor colds	812 (26.4)	268 (18.3)	59 (23.2)	485 (35.7)
No burnout	449 (22.9)	165 (16.5)	42 (23.6)	242 (31.1)
Burnout	363 (32.5)	103 (22.4)	17 (22.4)	243 (41.9)
Odds ratio[c] (95% CI)	1.62 (1.37-1.91)			
Recurrent respiratory infections	188 (6.1)	66 (4.5)	16 (6.3)	106 (7.8)
No burnout	81 (4.1)	31 (3.1)	10 (5.6)	40 (5.1)
Burnout	107 (9.6)	35 (7.6)	6 (7.9)	66 (11.4)
Odds ratio[c] (95% CI)	2.45 (1.82-3.31)			
Alcohol/drugs problems	97 (3.2)	56 (3.8)	4 (1.6)	37 (2.7)
No burnout	40 (2.0)	24 (2.4)	2 (1.1)	14 (1.8)
Burnout	57 (5.1)	32 (7.0)	2 (2.6)	23 (4.0)
Odds ratio[c] (95% CI)	2.57 (1.71-3.89)			

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[a] SAS: Specialty and Specialty Associate Doctors
[b] Burnout defined as an emotional exhaustion score ≥27 (range 0-54) and/or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[c] Odds ratio based on univariable Firth corrected logistic regression of wellbeing item vs burnout with stratification for group (consultant, SAS, trainee)

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Table 5. Univariable and multivariable logistic regression results (using Firth bias correction).

	Burnout[a]		Any DMP[b]	
Predictor variable	**Crude OR[c]**	**Adjusted OR**	**Crude OR**	**Adjusted OR**
Grade (versus consultants)				
SAS[d]	0.93 (0.70; 1.24)	1.14 (0.83; 1.55)	0.47 (0.28; 0.73)	0.40 (0.23; 0.65)
Trainees	1.63 (1.39; 1.90)	1.00 (0.77; 1.31)	0.66 (0.53; 0.82)	0.47 (0.32; 0.70)
Age (per 5 years)	0.87 (0.84; 0.90)	0.92 (0.87; 0.98)	1.04 (0.99; 1.09)	0.93 (0.85; 1.02)
Female (versus male)	1.12 (0.95; 1.31)	0.97 (0.81; 1.16)	0.70 (0.56; 0.87)	0.70 (0.55; 0.89)
Ethnicity (versus white)				
Asian	0.54 (0.45; 0.65)	0.74 (0.60; 0.91)	0.98 (0.77; 1.25)	1.15 (0.85; 1.54)
Black	0.57 (0.41; 0.78)	0.73 (0.51; 1.02)	0.79 (0.48; 1.24)	0.90 (0.53; 1.47)
Mixed	0.75 (0.54; 1.03)	0.82 (0.58; 1.15)	1.53 (1.01; 2.27)	1.89 (1.21; 2.89)
Other	1.37 (0.88; 2.12)	2.19 (1.37; 3.52)	0.84 (0.40; 1.59)	0.64 (0.29; 1.30)
Children	0.53 (0.46; 0.62)	0.78 (0.64; 0.97)	1.10 (0.88; 1.38)	1.03 (0.75; 1.41)
Current relationship	0.65 (0.54; 0.78)	0.87 (0.70; 1.07)	1.06 (0.82; 1.40)	1.07 (0.79; 1.46)
Medical Qualification from United Kingdom/Ireland (vs other country)	2.13 (1.81; 2.51)	1.74 (1.41; 2.16)	1.06 (0.85; 1.33)	0.84 (0.63; 1.14)
Full time (vs Less Than Full Time)	1.30 (1.06; 1.59)	1.28 (1.02; 1.62)	1.19 (0.90; 1.61)	0.91 (0.65; 1.27)
Burnout			3.84 (3.08; 4.79)	4.35 (3.46; 5.49)

[a]Burnout defined as an emotional exhaustion score ≥27 (range 0-54) and/or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[b]Defensive medical practice (DMP) defined as elevated levels of avoidance and/or hedging behaviour
[c] OR: Odds Ratio
[d] SAS: Specialty and Specialty Associate Doctors

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Supplementary Online Content

eTable 1. Missing data among actively practicing participants

eTable 2. Demographic data of trainees in study and Royal College of Obstetricians and Gynaecologists Training Evaluation Form (TEF) 2018 Survey

eTable 3. Spearman correlations between Maslach Burnout Inventory (MBI) and Defensive Medical Practice (DMP) subscales

eTable 4. Descriptive statistics and crude odds ratio of defensive practice according to each Maslach Burnout Inventory subscale

eFigure 1. Scatter plot of Emotion Exhaustion and Depersonalization Maslach Burnout Inventory subscales

eFigure 2. Nomograms of the multivariable logistic regression models for burnout and any Defensive Medical Practice

eDiscussion. Survey response rate amongst trainees

eMethods. Survey questionnaire

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eTable 1. Missing data among actively practicing participants

	Consultants N=1462	SAS[a] N=254	Trainees N=1357
Age, mean (range)	None missing	None missing	None missing
Gender	19 (1%)	2 (1%)	20 (1%)
Ethnicity	10 (1%)	1 (<1%)	8 (1%)
Parity	None missing	None missing	None missing
Relationship	3 (<1%)	None missing	5 (<1%)
Medical Qualification country of origin	None missing	1 (<1%)	1 (<1%)
Work status (Full Time vs Less Than Full Time)	None missing	1 (<1%)	2 (<1%)
Maslach Burnout Inventory	None missing	None missing	None missing
Defensive practice	None missing	None missing	None missing

[a]SAS: Specialty and Specialty Associate Doctors

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eTable 2. Demographic data of trainees in study and Royal College of Obstetricians and Gynaecologists (RCOG) Training Evaluation Form (TEF) 2018 Survey

	RCOG TEF Database (n=1754) (%)[a]	Trainees (n=1357) (%)
Age		
20-29	497 (28.3%)	336 (24.8%)
30-29	1092 (62.3%)	897 (66.1%)
40-49	106 (6.0%)	115 (8.4%)
50-59	2 (0.1%)	9 (0.7%)
Over 60	0	0
Missing data	57 (3.3%)	0
Female	1387 (79.1%)	1067 (79.8%)
Ethnicity		
White	1108 (63.2%)	857 (63.2%)
Asian	381 (21.7%)	288 (21.2%)
Black	97 (5.5%)	90 (6.6%)
Mixed	83 (4.7%)	88 (6.5%)
Other	68 (3.9%)	26 (1.9%)
Missing data	17 (1%)	8 (0.6%)

[a] RCOG TEF survey sent to 1956 trainees who held a National Training Number and an email address associated with an active ePortfolio at the time of the survey, which is used to assess competencies and training progress. It was responded to by 1754 trainees (89.7% response rate).

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eTable 3. Spearman correlations between Maslach Burnout Inventory and defensive medical practice subscales

	EE[b]	DP[c]	PA[d]	Av[e]	He[f]
MBI[a] – EE	1				
MBI – DP	0.57	1			
MBI – PA	-0.30	-0.34	1		
Av	0.28	0.30	-0.19	1	
He	0.34	0.38	-0.17	0.41	1

[a] MBI: Maslach Burnout Inventory
[b] EE: Emotional Exhaustion
[c] DP: Depersonalization
[d] PA: Personal Accomplishment
[e] Av: Avoidance
[f] He: Hedging

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eTable 4. Descriptive statistics of defensive practice according to each Maslach Burnout Inventory (MBI) subscale

MBI[a] subscales	Avoidance		Hedging		Any DMP[b]
	Mean score	% Elevated	Mean score	% Elevated	%
High emotional exhaustion					
No (n=2157)	0.88	85 (4%)	3.76	125 (6%)	179 (8%)
Yes (n=916)	1.82	111 (12%)	7.05	164 (18%)	221 (24%)
Odds ratio[c] (95% CI)		3.36 (2.51-4.51)		3.54 (2.77-4.54)	3.51 (2.83-4.36)
High depersonalization					
No (n=2468)	0.95	106 (4%)	3.93	159 (6%)	229 (9%)
Yes (n=605)	2.02	90 (15%)	8.06	130 (21%)	171 (28%)
Odds ratio[c] (95% CI)		3.89 (2.89-5.23)		3.97 (3.09-5.11)	3.85 (3.08-4.81)
Low personal accomplishment					
No (n=2066)	0.97	103 (5%)	4.19	142 (7%)	202 (10%)
Yes (n=1007)	1.55	93 (9%)	5.87	147 (15%)	198 (20%)
Odds ratio[c] (95% CI)		1.94 (1.45-2.59)		2.31 (1.81-2.96)	2.26 (1.83-2.79)

[a] MBI: Maslach Burnout Inventory
[b] DMP: Defensive Medical Practice
[c] Odds ratios are based on univariable logistic regression with Firth bias correction.

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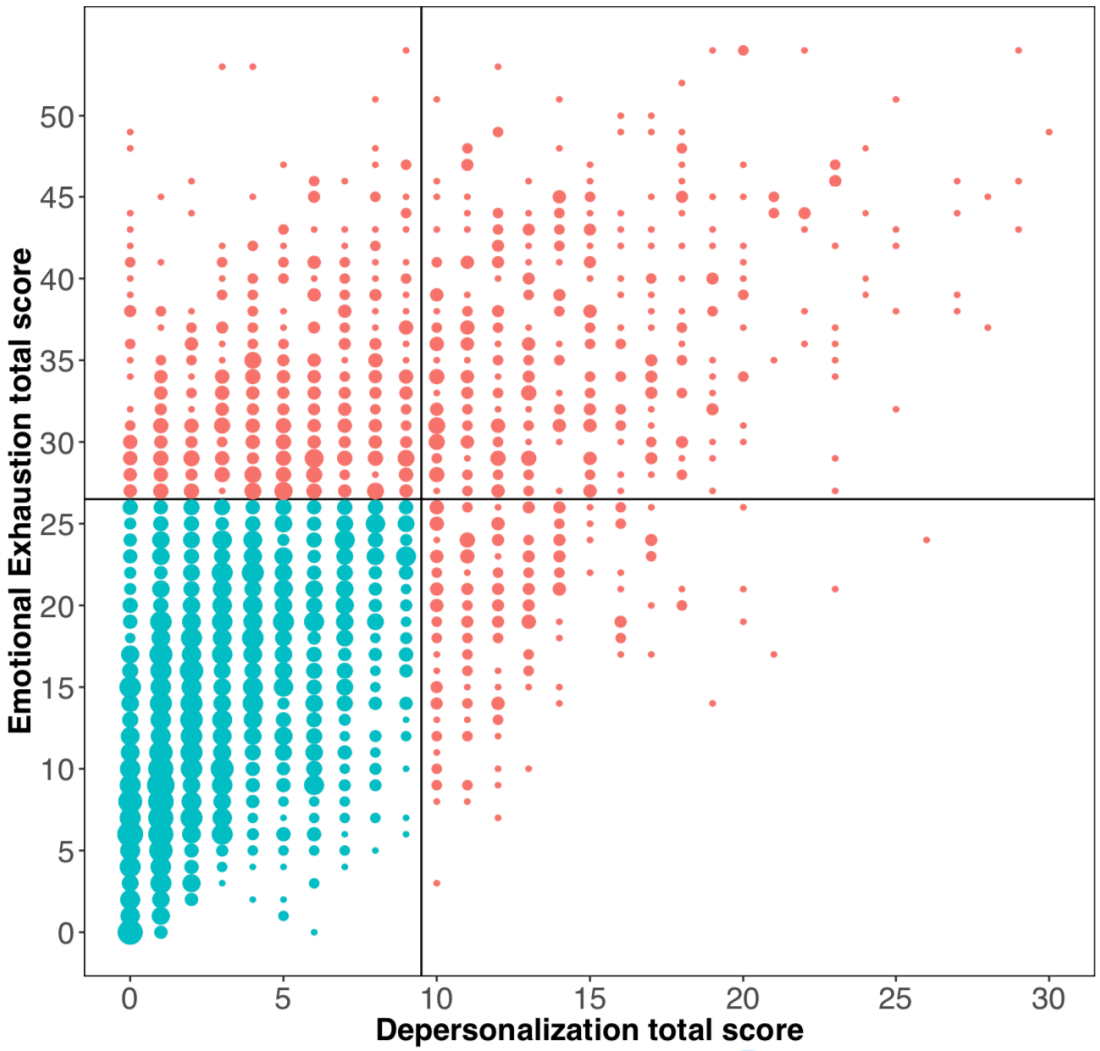
eFigure 1. Scatter plot of Emotion Exhaustion and Depersonalization Maslach Burnout Inventory subscales



The cutoff values used to define burnout (emotional exhaustion ≥27 and depersonalization ≥10) are shown with a line with cases meeting the threshold in red. The size of the dots corresponds to the number of cases with these values.

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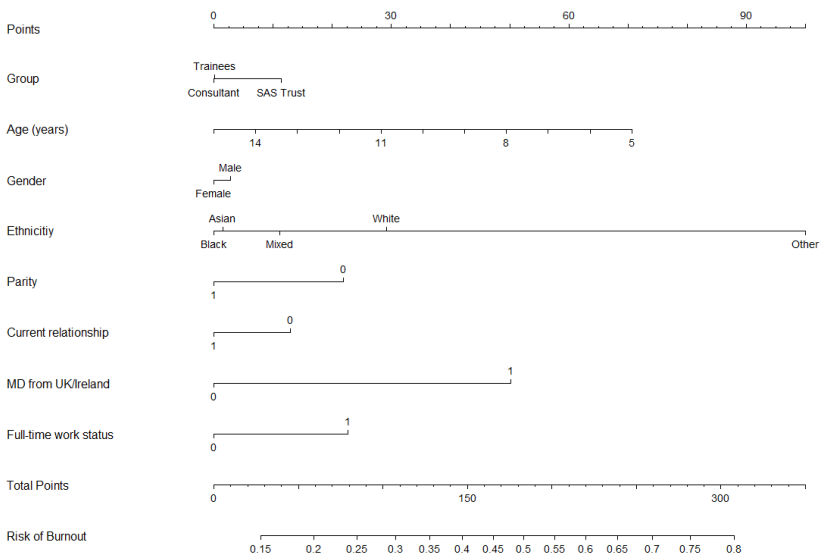
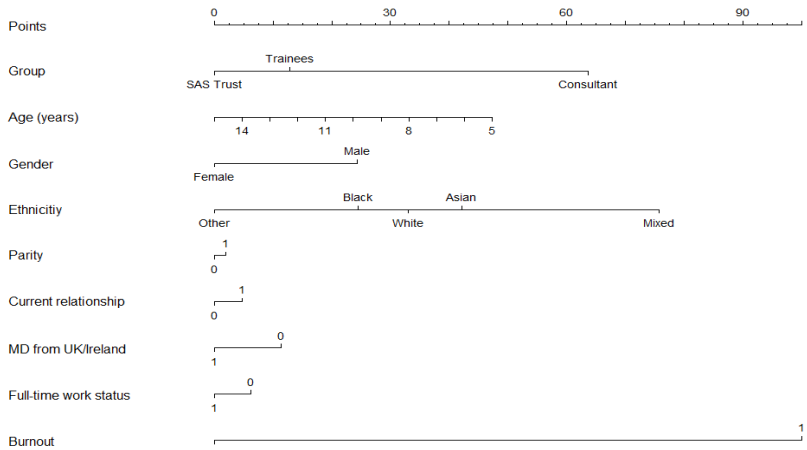
eFigure 2. Nomograms of the multivariable logistic regression models for burnout (A) and any defensive medical practice (B)

A



B



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eDiscussion. Survey response rate amongst trainees

Our survey study was sent to trainees working in Obstetrics and Gynecology in the United Kingdom, registered with the Royal College of Obstetricians and Gynaecologists (RCOG) and identified as trainees on the RCOG main database (n=2375) which is the system from which data is extracted for mailings. This is not however the same list used to distribute the RCOG TEF survey (n=1956, eTable 2 in the Supplement) which is sent to trainees who currently hold a National Training Number and an email address associated with an active ePortfolio, which is used to assess competencies and training progress. In view of this, we believe that a proportion of trainees to whom our survey was sent to (based on being identified as a trainee on the RCOG main database) are likely to have been left on the distribution list, but have in fact subsequently suspended training for a period of time or who are no longer trainees and have not informed the RCOG. These doctors would therefore not have completed the survey. This may account for a proportion of the difference in the numbers of trainees between the mailing list we used and that used for the RCOG TEF survey.

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eMethods. Survey Questionnaire

The survey was sent to three participant groups: consultants, specialty and specialty associate (SAS) doctors and trainees with each receiving a tailored version. The questions are marked accordingly.

We are unfortunately unable to include the Maslach Burnout Inventory questionnaire items as these are copyright restricted.

Section 1: About you

The following questions apply to all doctors:

Age

Gender

- Female
- Male
- Intersex
- Other (Specify)
- I do not wish to disclose

Ethnicity

- Asian/Asian British
  - Bangladeshi
  - British
  - Indian
  - Pakistani
  - Sri Lankan
- Black/African/Caribbean/Black British
  - African
  - British
  - Caribbean
- Mixed/multiple ethnic groups
  - British
  - White & Asian
  - White & Black African
  - White & Black Caribbean
- White (UK & Ireland)
  - British
  - English
  - Irish
  - Northern Irish
  - Scottish
  - Welsh
- Other Ethnic Group
  - Arab
  - Chinese
  - Dutch
  - Egyptian
  - French
  - German
  - Italian
  - Japanese
  - Korean
  - Malaysian
  - Middle Eastern
  - Myanmar
  - Persian
  - Portuguese
  - Romanian
  - Russian
  - Singaporean

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Sri Lankan
Sudanese
Other (Specify)
I do not wish to disclose

Nationality
British
English
Irish
Northern Irish
Scottish
Welsh
American
Australian
Bangladeshi
Barbadian
Canadian
Chinese
Dutch
Egyptian
German
Ghanaian
Greek
Hong Kongers
Indian
Iraqi
Italian
Jamaican
Jordanian
Libyan
Malaysian
Maltese
Mauritian
Myanmar
New Zealander
Nigerian
Pakistani
Polish
Romanian
Singaporean
South African
Sri Lankan
Sudanese
Syrian
Trinidadian
Zimbabwean
Other (Specify)
I do not wish to disclose

Religion or Belief
Atheism
Buddhism
Christianity
Hinduism
Islam
Jainism
Judaism
Quaker
Sikhism
Other (Specify)
No religion
I do not wish to disclose

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Disability
- Yes
- No
- I do not wish to disclose

Do you have children?
- No
- One
- Two
- Three
- Four +
- I do not wish to disclose

In what country did you obtain your primary medical degree?

The following question applies to trainees only:
How many years have you been qualified as a doctor? Number

The following questions apply to SAS doctors only:
Have you ever held a UK National Training Number (NTN)?
- Yes
- No

If no, are you interested in acquiring one?
- Yes
- No
- Other (please specify)

Are you working towards entry on the specialist register through the Certificate of Eligibility for Specialist Registration (CESR)?
- Yes
- No
- No - I am not currently working towards it but am planning to in the future
- No - I am already on the specialist register
- Undecided
- Other (specify)

If you are already on the Specialist Register, have you applied for consultant posts?
- Yes - but not yet successful
- No
- N/A
- Other (please specify)

What category of RCOG membership are you in?
- Associate
- Fellow
- Member

Are you currently involved in College work?
- No
- Yes - examiner
- Yes - committee member
- Yes - advisory group
- Yes - working group
- Not currently - but have been in past or other (please specify)

The following questions apply to consultants only:
In which country was the majority of your specialty training completed
How many years have you been qualified to be a consultant?

Section 2: Your Role
The following questions apply to trainees only:
What best describes your current work status?
- Specialty Trainee (ST)
- Parental leave
- Out of programme (OOP) research
- OOP clinical experience

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OOP career break
OOP teaching
OOP research/teaching
OOP clinical experience/teaching
Academic clinical fellow
Academic clinical lecturer
Subspecialty training (SST) Gynaecological Oncology
SST Maternal and Fetal Medicine
Fixed Term Specialty Training Appointment (FTSTA)
Medical Training Initiative (MTI)
SST Urogynaecology
SST Reproductive Medicine
Clinical Fellow
Other (specify)

Who is your training Local Education and Training Board (LETB)/Deanery?

East of England
Kent, Surrey and Sussex
Merseyside
North Central and East London
North East
North West
North West London
Northern Ireland
Oxford
Scotland
Severn
South London
South West
Thames Valley
Wales
Wessex
West Midlands
Yorkshire and the Humber
Other (specify)

What training level are you at?

ST1
ST2
ST3
ST4
ST5
ST6
ST7
Other (specify)

If relevant, what is your sub-speciality/special interest?

Abortion care/sexual health
Paediatric and adolescent gynaecology
Reproductive medicine/Subfertility
Urogynaecology
Vulval disease
Medical education
Minimal access surgery
Risk management
Patient Safety leadership
Leadership
Acute gynaecology and early pregnancy
Benign gynaecology surgery
Colposcopy and cervical pathology
Fetal Medicine
Gynaecological oncology
High-risk pregnancy and maternal medicine

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Labour ward
Menopause/post-reproductive health
Sub Specialty - Gynaecological oncology
Sub Specialty - Maternal and fetal medicine
Sub Specialty - Reproductive medicine
Sub Specialty - Urogynaecology
Sub Specialty - Sexual and Reproductive Health
N/A
Other (Specify)

Do you do any non-NHS work and/or non O&G work?
Yes
No

The following questions apply to SAS doctors only:

What best describes your current work status?
Actively practising in healthcare outside of O&G
Actively practising in O&G
On a career break/sabbatical
On parental leave
On sick leave
Other (specify)

What job title do you have?
Specialty Doctor
Associate Specialist
Staff grade
Trust Doctor
Trust Registrar
Clinical Fellow
Clinical Assistant
Locum Appointment for Training/Service
Foundation Year 3
Other (Specify)

Why did you take up your current post? (select all that apply)
Geographical Stability
Work-life balance
Regular hours
Pay
Not on Specialist register and unable to get a trainee post
On Specialist register but unable to get a consultant post
No on call
Other (specify)

Who are you contracted to work for?
Pure NHS
Joint NHS with other
Joint NHS/academic - majority NHS funded (e.g. honorary academic post)
Pure academic/research (e.g. paid for by university)
Other (Specify)

Do you work in an NHS teaching (tertiary referral) hospital or a District General Hospital? If neither, please give details.
NHS teaching hospital
District General hospital
Neither - please specify

Are you employed on a contract with nationally agreed terms and conditions?
Yes
No
Don't know

In what areas of O&G do you practice?
Gynaecology only
Obstetrics and Gynaecology
Obstetrics only

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Other (Specify)

Do you have a special interest? (select all that apply)

Fertility
Sexual Health
Early Pregnancy
Acute Gynaecology
Leadership
Labour ward
Antenatal care
Maternal Medicine
Fetal Medicine
Diabetic Pregnancy
Gynae-oncology
Colposcopy
Psychosexual health
Benign Gynaecology
Minimally invasive surgery
Menopause
Gynae ultrasound
Obstetric ultrasound
Maternal Mental health
No
Other (Specify)

Do you currently work at a registrar or consultant level

Consultant level
Registrar level
Both
Other (specify)

Do you do any non-NHS work and/or non O&G work?

No
Yes - Please specify

The following questions apply to consultants only:

What best describes your current work status?

Actively practising in healthcare outside O&G
Actively practising in O&G
On a career break/sabbatical
On parental leave
On sick leave
Retired
Other (Specify)

Who are you contracted to work for? (Yes/No)

Pure NHS
Pure academic/research (e.g paid for by university)
Joint NHS/academic - majority NHS funded (e.g honorary academic post)
Joint NHS/academic - majority academic funded (e.g university with honorary NHS)
Joint NHS with other
Joint academic/research with other
Other (including not currently working)

What is your primary post?

Consultant O&G
Consultant Gynaecologist
Consultant Obstetrician
Locum Consultant
Consultant Sexual & Reproductive Health
Professor
Acting Consultant
Consultant Private Practice
Consultant GUM
Academic Senior Clinical Fellow

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Honorary Consultant
Senior Clinical Lecturer Honorary
Senior Lecturer
Senior Clinical Research Fellow
Emeritus Professor
Other (Specify)

Which would best describe your post?
Special interest
Sub-specialty
Other (Specify)

If relevant, what is your subspecialty/special interest?
Abortion care/sexual health
Acute gynaecology and early pregnancy
Benign gynaecological surgery (office gynaecology, hysteroscopy, etc
Colposcopy and cervical pathology
Fetal medicine
Gynaecological oncology
High risk pregnancy/Maternal medicine
Labour Ward
Menopause/Post reproductive health
Paediatric and adolescent gynaecology
Reproductive medicine/Subfertility
Urogynaecology
Vulval disease
Medical education
Minimal access surgery
Risk management
Patient Safety leadership
Leadership
Sub specialty - Gynaecological oncology
Sub specialty - Maternal and fetal medicine
Sub specialty - Reproductive medicine
Sub specialty - Urogynaecology
Sub specialty - Sexual and reproductive health
N/A
Other (Specify)

Do you do any private work?
Yes
No
N/A
Other (Specify)

Do you hold any of the following leadership roles? (Yes/No)
Clinical Director
Medical Director
Clinical Governance Lead
Labour Ward Lead
Special Interest Lead
Audit Lead
Risk Management Lead
No
Other (specify)

If yes, how are you remunerated for these lead positions (in terms of programmed activities (PAs))?

0.5
1
1.5
2
2.5
3
3.5

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4
4.5
5
6
6.5
7
8
10
Responsibility payment
N/A

Are these included in your weekly job plan, or are they additional?

Yes, Includes
No, additional
Other (Specify)

Section 3: Your Working Patterns and Professional Development

The following questions apply to trainees only:

Do you work full time or less than full time (LTFT)?

Full-Time
LTFT, (50%)
LTFT, (60%)
LTFT, (70%)
LTFT, (80%)
LTFT, (90%)
Other (Specify)

When completing your training do you intend to work full time or LTFT?

LTFT
Work full time
Uncertain
Other (Specify)

What is the on call frequency at your level?

1:1
1:2
1:3
1:4
1:5
1:6
1:7
1:8
1:9
1:10
1:11
1:12
1:14
1:15
1:16
1:18
1:19
1:20
N/A
Other (specify)

What type of middle grade on call rota does your unit have during the day, excluding consultant cover?

Single middle grade on call rota with ST1-2 level cover (including junior cover by other doctors e.g. Foundation & General Practice (GP) trainees)
Single middle grade on call rota without ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)
Two middle grades on call working at the same level with ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)
Two middle grades on call working at the same level without ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)

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Two tier middle grade rota with one senior and one junior middle grade with ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)
Two tier middle grade rota with one senior and one junior middle grade without ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)
Other (specify)

Have you ever taken any time out of programme during your training? (Please select all that apply)
OOPT
OOPE
OOPR
OOPC
OOPE/T
OOPR/T
Parental leave
No
Other (please specify)

After you complete training what area of O&G do you intend to practice?
Benign gynaecological surgery (office gynaecology, hysteroscopy, etc.)
Colposcopy and cervical pathology
Fetal medicine
Gynaecological oncology
High risk pregnancy/Maternal medicine
Labour Ward
Menopause/Post reproductive health
Other (specify)

After completion of your training do you intend work resident out of hours?
Yes
No

If you intend to work resident out of hours do anticipate this will be for your entire career?
Early career only
Entire career
Unsure
N/A
Other (specify)

Are you aware of gaps in the rota at your level at your current unit?
Yes
No
N/A

Do you have specialty doctors (SAS, Trust, etc.) supporting your rotas?
Yes
No
N/A

The following questions apply to SAS doctors only:

How many hours/week are you contracted to work?
<20
20-39
40
41-50
>50

Do you work resident out of hours on call?
No
Yes
N/A

If yes, is this first on call, second on call or third on call?
Please specify

If you work resident out of hours do you anticipate this will be your entire career?
Early career only
Entire career
Other - Please specify
N/A

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Do you work non-resident consultant level out of hours on call?

Yes
No
Other - please specify

Does your job plan include at least 4 hours/week (= one session if on programmed activities (PA) contract) for supporting professional activities (SPA)? (SPA = non clinical time for audit, teaching, governance, CPD, appraisal)

Yes
No
Don't know

When on call what areas do you cover?

Gynaecology only
Obstetrics and gynaecology
Obstetrics only
Other (specify)

Do you have an educational supervisor?

Yes
No
Don't know
Other (specify)

Do you work in a formal educational role?

Educational supervisor
Clinical supervisor
Teaching Fellow
SAS Tutor
Other (specify)

Do you have a formal leadership role?

Medical Director
Associate Medical Director
Clinical Director
Audit Lead
Governance Lead
Service Lead
Other (specify)

Are you, or have you ever been, principle investigator (PI) for a research project?

Yes
No
Other (specify)

Are you, or have you ever been, an appraiser?

Yes
If you were but are no longer an appraiser then why did you stop? (specify)
No

If yes, do you appraise consultants?

Yes
No

Do you work autonomously (have your own clinics and/or theatre lists)?

Yes
No

If yes, is this work coded in your own name or a consultants name?

Own
Consultant
Don't know
Other (specify)

The following questions apply to consultants only:

Has your workload increased in the last 12 months?

Yes
No
Other (Specify)

Do you work full time or LTFT?

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Full Time
LTFT, 10%
LTFT, 20%
LTFT, 30%
LTFT, 40%
LTFT, 50%
LTFT, 60%
LTFT, 70%
LTFT, 80%
LTFT, 90%
N/A
Other (Specify)

How many PAs per week are in your job plan?
Number (to nearest 0.5)
N/A
Other - Specify

Number of Direct Clinical Care PAs
Number (to nearest 0.5)
N/A
Other (Specify)

Number of Supporting Professional Activities (SPAs)
Number (to nearest 0.5)
N/A
Other (Specify)

Number of Academic PAs
Number (to nearest 0.5)
N/A
Other (Specify)

Number of other (i.e. education, managerial) PAs
Number (to nearest 0.5)
N/A
Other (Specify)

What is the O&G split of your daytime PAs?
0% Obstetric, 100% Gynaecology
10% Obstetric, 90% Gynaecology
100% Obstetric, 0% Gynaecology
20% Obstetric, 80% Gynaecology
30% Obstetric, 70% Gynaecology
40% Obstetric, 60% Gynaecology
50% Obstetric, 50% Gynaecology
60% Obstetric, 40% Gynaecology
70% Obstetric, 30% Gynaecology
80% Obstetric, 20% Gynaecology
90% Obstetric, 10% Gynaecology
N/A

Would you like to decrease the amount of obstetric work you do?
Yes
No
N/A

Are any of your PAs out of hours (evening, weekend, emergency, on-call etc.)?
Yes
No
N/A

If you work over night on call would you like to reduce this?
Yes
No
N/A

If you work out of hours, what is your PA split?
0% Obstetric, 100% Gynaecology
10% Obstetric, 90% Gynaecology

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100% Obstetric, 0% Gynaecology
20% Obstetric, 80% Gynaecology
30% Obstetric, 70% Gynaecology
40% Obstetric, 60% Gynaecology
50% Obstetric, 50% Gynaecology
60% Obstetric, 40% Gynaecology
70% Obstetric, 30% Gynaecology
80% Obstetric, 20% Gynaecology
90% Obstetric, 10% Gynaecology
N/A

Does your job plan require you to work routinely resident in the hospital outside 'office hours'?
Yes
No
N/A

If yes, are these twilight/weekend day shifts or can they include time after midnight?
Twilight/weekend day shifts only
Include time after midnight
N/A
Other

Who is resident with you usually for twilight/weekend days?
A junior grade (GP trainee, F2)
An O&G trainee (or equivalent) (ST1/ST2)
At least one doctor who is ST3 or higher
N/A
Other (Specify)

Who is resident with you usually for after midnight shifts?
A junior grade (GP trainee, F2)
An O&G trainee (or equivalent) (ST1/ST2)
At least one doctor who is ST3 or higher
N/A
Other (Specify)

Do you plan to reduce sessions as part of your retirement plan?
Yes
No
Don't know
N/A
Other (Specify)

When (what year) do you plan to retire completely from clinical work?
2018-2019
2019-2020
2021-2025
2026-2030
2031-2035
2036-2040
2041-2045
2046-2050
2051-2055
2056-2060

Do you intend to retire and then return to work?
Yes - please specify intended number of sessions
No
Other (Specify)

When on duty are you aware of gaps in the trainee's rotas?
Frequently
Infrequently
Never
Often
N/A

Are you ever required to fill in for absent staff at a lower grade?
Frequently

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Infrequently
Never
Often
N/A

Do you have specialty doctors (SAS, Trust, etc.) supporting your rotas?

Yes
No
N/A

If yes, which of these roles provide this service? (Yes/No)

Associate Specialist
LAS/LATs
Staff Grade
Trust Doctor
Other (Specify)

Do you feel you have a team structure that adequately supports your development and practice needs?

Yes - please explain why
No - please explain why
Don't know
N/A

If yes, can we contact you to obtain a copy of your team structure?

Yes
No
N/A

Section 4: Your Wellbeing

The following questions apply to trainees and SAS doctors only:

Since starting specialty training how often have you thought of leaving O&G/medicine entirely?

Daily
Weekly
Monthly
Occasionally
Never

If you have or would ever consider leaving speciality training what reasons would you give? (Please only tick those that would impact on your decision)

Family
Lack of work-life balance
Pay
Long working hours
Shift working
Intense workload
Rota gaps
Desire to work abroad
Inability to work less than full time
Issues with gaining adequate clinical experience when working less than full time
Preference to work in another geographic area
Preference to work in another specialty
Personal Health
Physical demands of the job
Personal mental health
Stress
Lack of clinical supervision
Poor pastoral support
Poor educational supervision
Low morale
No support from colleagues
No social interaction with colleagues
Commuting distance
Frustration with training
Frustration with health service

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Blame culture
Lack of improvement
Litigation
Fear of litigation
No opportunities to debrief following adverse event or serious incident
No support following adverse event or serious incident
Patient care/safety concerns
Concerns with new contract
Insufficient financial remuneration
Under resourced health service
N/A
Other (Specify)

What are the positive aspects of O&G that you experience and make you want to pursue this as your chosen career? (Please select all that apply)

Unique mix of medicine and surgery
Good communication / team working
Demonstrating your ability to cope well under pressure
Good support from colleagues
Good support from trainers/supervisors
A balanced work intensity that makes the job interesting and enjoyable
Financial remuneration
Sub-Specialty training
Academic training
Research opportunities
Personally fulfilling/rewarding
Challenging (but with appropriate support)
Out of programme opportunities
Ability to work flexibly
Being seen as a valued team member
Don't know
Other (Specify)

Do post-shift rest facilities exist within your hospital (e.g. a sleep off room)?

Yes
No
I don’t know

Have you ever used such facilities?

Yes
No
N/A

If they exist, how easily accessible are these facilities?

Difficult
Don't know
Easy
Some effort
Very difficult
Very easy
N/A

Do you have accessible and adequate rest facilities available during your night shifts (i.e. private area with bedding/comfortable chair)?

Yes
No
I don’t know
N/A

Have you ever used such facilities?

Yes
No
N/A

If they exist, how easily accessible are these facilities?

Difficult
Don't know

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Easy
Some effort
Very difficult
Very easy
N/A

How often do you sleep for at least 30 minutes uninterrupted during a night shift?
About half
Less than half
Most shifts
Never
N/A

How do you normally commute home after a night shift?
Cycle
Drive - car
Drive - motorcycle
Other (Specify)
Public transport
Taxi or equivalent
Walk
N/A

How long does your commute usually take after a night shift?
15-30 minutes
30-60 minutes
< 15 minutes
> 60 minutes
N/A

If applicable, do you ever feel too tired to drive home after a night shift?
Yes
No
N/A

If applicable, have you ever had an accident/near miss when driving home after a night shift?
No
Yes
Prefer not to say
N/A

The following sections apply to all doctors

Section 5: Maslach Burnout Inventory (Copyright Restricted)

Section 6: Defensive Medical Practice

Within the last 6 months, have you ever taken the following actions which you would not have done if you were not worried about possible consequences such as complaints, disciplinary actions by managers, being sued, or publicity in the media? For each of the following, please rate each item on a 5-point Likert scale

Avoidance (3 items)

Avoided a particular type of invasive procedure
Never
Rarely
Sometimes
Quite often
Often

Not accepted "high risk" patients in order to avoid possible complications
Never
Rarely
Sometimes
Quite often
Often

Stopped doing aspects of your job
Never

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Rarely
Sometimes
Quite often
Often

Hedging (9 items)

Prescribed more medications than medically indicated
Never
Rarely
Sometimes
Quite often
Often

Referred to specialists in unnecessary circumstances
Never
Rarely
Sometimes
Quite often
Often

Conducted more investigations or made more referrals than warranted by the patient's condition
Never
Rarely
Sometimes
Quite often
Often

Admitted patients to hospital when the patient could have been discharged home safely or managed as an outpatient
Never
Rarely
Sometimes
Quite often
Often

Asked for more frequent observations to be carried out on a patient than necessary
Never
Rarely
Sometimes
Quite often
Often

Written in patients' records specific remarks such as "not suicidal" which you would not if you were not worried about legal/media/disciplinary consequences
Never
Rarely
Sometimes
Quite often
Often

Written more letters about a patient than is necessary to communicate about the patient's condition

Referred patient for a second opinion more than necessary
Never
Rarely
Sometimes
Quite often
Often

Carried out more tests than necessary
Never
Rarely
Sometimes
Quite often
Often

Section 7: Doctor Wellbeing

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In the past 12 months have you experienced:

Cardio-vascular problems (e.g. high blood pressure, angina, heart attack)
- Yes
- No

Gastro-intestinal problems (e.g. gastritis, irritable bowel syndrome, ulcers)
- Yes
- No

Depression
- Yes
- No

Anxiety
- Yes
- No

Anger & irritability
- Yes
- No

Other mental health problems
- Yes
- No

Suicidal thoughts
- Yes
- No

Sleep problems/insomnia
- Yes
- No

Marital/relationship problems
- Yes
- No

Frequent headaches
- Yes
- No

Minor colds
- Yes
- No

Recurring respiratory infections
- Yes
- No

None of the above
- Yes
- No

Other
- Yes (please specify)
- No

Any additional life stressors (e.g. bereavement, accident etc.)
- Yes – currently (in the last 6 months)
- Yes – in the past (more than 6 months ago)
- No

Have you ever been aware of, or other people raised concerns, that you are drinking too much alcohol or taking (prescribed or non-prescribed) drugs?

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STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6-7
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	7-8
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	N/A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9-10
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9-10
		(*b*) Describe any methods used to examine subgroups and interactions	9-10
		(*c*) Explain how missing data were addressed	9-10
		(*d*) If applicable, explain how loss to follow-up was addressed	9-10
		(*e*) Describe any sensitivity analyses	9-10
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10-11
		(b) Give reasons for non-participation at each stage	10-11
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10-11
		(b) Indicate number of participants with missing data for each variable of interest	10-11
		(c) Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Report numbers of outcome events or summary measures over time	11

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Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-13
		(*b*) Report category boundaries when continuous variables were categorized	11-13
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11-13
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-16
Generalisability	21	Discuss the generalisability (external validity) of the study results	13-16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

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Burnout, Wellbeing and Defensive Medical Practice amongst Obstetricians and Gynaecologists in the United Kingdom: cross-sectional survey study

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Burnout, Wellbeing and Defensive Medical Practice amongst Obstetricians and Gynaecologists in the United Kingdom: Cross-sectional survey study

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Abstract

Objectives: To determine the prevalence of burnout in doctors practising obstetrics and gynaecology, and assess the association with defensive medical practice and self-reported wellbeing.

Design: Nationwide online cross-sectional survey study; December 2017-March 2018.

Setting: Hospitals in the United Kingdom

Participants: 5661 practising Obstetrics and Gynaecology consultants, specialty and associate specialist doctors and trainees registered with the Royal College of Obstetricians and Gynaecologists

Primary and Secondary Outcome Measures: Prevalence of burnout using the Maslach Burnout Inventory and defensive medical practice (avoiding cases or procedures, overprescribing, over-referral) using a 12-item questionnaire. The odds ratios of burnout with defensive medical practice and self-reported wellbeing.

Results: 3102/5661 doctors (55%) completed the survey. 3073/3102 (99%) met the inclusion criteria (1462 consultants, 1357 trainees and 254 specialty and associate specialist doctors). 1116/3073 (36%) doctors met the burnout criteria, with levels highest amongst trainees (580/1357 [43%]). 258/1116 (23%) doctors with burnout reported increased defensive practice compared to 142/1957 (7%) without (adjusted odds ratio 4.35, 95% CI 3.46 to 5.49). Odds ratios of burnout with wellbeing items varied between 1.38 and 6.37, and were highest for anxiety (3.59, 95% CI 3.07 to 4.21), depression (4.05, 95% CI 3.26 to 5.04), and suicidal thoughts (6.37, 95% CI 95% CI 3.95 to 10.7). In multivariable logistic regression, being of younger age, white or 'other' ethnicity, and graduating with a medical degree from the UK or Ireland had the strongest associations with burnout.

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Conclusions: High levels of burnout were observed in obstetricians and gynaecologists and particularly amongst trainees. Burnout was associated with both increased defensive medical practice and worse doctor wellbeing. These findings have implications for the wellbeing and retention of doctors as well as the quality of patient care, and may help to inform the content of future interventions aimed at preventing burnout and improving patient safety.

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Article Summary - Strengths and limitations of this study

- First nationwide survey in the United Kingdom which examines the prevalence of burnout as well as its relationship to defensive medical practice and self-reported wellbeing
- This study includes a large number of doctors working in obstetrics and gynaecology and has a good response rate
- Use of the Maslach Burnout Inventory, a widely available and validated tool for measuring burnout amongst doctors allows for comparison with other research in this field
- The response rate of 54.8% is a limitation which introduces the possibility of selection bias; this must be considered when interpreting the findings

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Introduction

Doctor burnout and mental wellbeing is an important concern internationally(1-5) because of the high reported prevalence(6) and serious consequences for both staff and patients.(7) Burnout syndrome, which is a response to prolonged exposure to occupational stress, is characterised by three dimensions: emotional exhaustion, depersonalisation and reduced personal accomplishment.(8) International studies have shown that burnout is nearly twice as common amongst doctors compared with other healthcare workers.(7) A recent survey by the General Medical Council reported that 24% of trainees and 21% of trainers from across the United Kingdom (UK) described 'feeling burnt out' based on self-reported symptoms.(9) The consequences of burnout amongst doctors have been investigated primarily in the United States (USA)(10) with relatively few large studies conducted in Europe(11-16) and Asia(17, 18) to validate these findings internationally. These include a negative impact on health including higher rates of substance abuse, depression, suicide and a poorer quality of life.(19, 20) Moreover, burnout in doctors has a significant impact on the productivity of healthcare organisations, intentions to leave medical practice, and both the quality and safety of patient care.(21-25) At present, it is unclear if these findings and the proposed interventions can be extrapolated to the United Kingdom (UK) due to a paucity of data on doctor burnout in this setting.(26, 27)

Evidence from studies in Europe(15, 28) and the USA(2) suggest that burnout may be experienced by up to half of doctors in obstetrics and gynaecology (O&G),(29, 30) and that the prevalence of burnout in O&G is one of the highest of any specialty. This may be related to the high-acuity and rapid turnover of patients associated with O&G (31). Burnout is also associated with increased job turnover and reduced workforce retention.(32, 33) Furthermore, a key consequence of doctor burnout is the impact on patient care. A recent meta-analysis suggested burnt out doctors are twice as likely to be involved in patient safety

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incidents and deliver a lower quality of patient care.(34) This is a significant issue in O&G, a specialty already associated with high levels of litigation(35) with obstetric claim settlements costing the NHS over £500 million annually.(36) These high litigation rates are partly attributable to the large number of safety incidents and complaints(37, 38) and a parallel culture of intolerance when errors are made. The overall impact of this 'complaints culture' on doctors is substantial.(39) A UK wide study on the impact of complaints on doctor welfare demonstrated that they are associated with an increased risk of depression, anxiety and suicidal ideation as well as increased defensive practice.(40-42) Defensive medical practice (DMP) is defined as a doctor's deviation from standard practice in response to complaints or criticism(43) which can potentially harm patients as a result of either over-investigation and treatment or because clinicians avoid involvement in difficult cases.(35) A small study of DMP among UK doctors demonstrated that 26.4% of O&G doctors report practising some form of defensive medicine(35, 43). Although the overall effect and cost of the practice of defensive medicine has not been established in the UK, it is thought to represent a highly significant strain on healthcare resources and in the USA, it is estimated to cost $46 billion annually.(44)

There has been great focus by the UK government through initiatives such as 'The Maternal and Neonatal Health Safety Collaborative'(45) to implement strategies which aim to improve maternity safety and outcomes. A facet of this work involves 'understanding the culture' of the O&G workforce.(45) However, to our knowledge, there is currently no quantitative data relating to burnout amongst doctors working in O&G in the UK to inform policy and potential interventions in relation to NHS workforce sustainability (46) as well as any impacts on the quality of patient care (6). Thus, there is a clear need to identify the prevalence and factors associated with burnout amongst doctors. We conducted a nationwide cross-sectional survey study to assess burnout, defensive medical practice and

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associated personal and work factors in O&G doctors in the UK. The aims were firstly to ascertain the prevalence of burnout in the cohort, secondly to determine the levels of DMP and doctor wellbeing and explore their relationship with burnout. Finally, we aimed to explore the relationships between age, gender, ethnicity, doctor seniority, and both burnout and DMP.

Methods

All consultants (equivalent to an attending physician in the USA), specialty and specialty associate (SAS) doctors (doctors who have completed specialist training but do not have a staff position) and trainees (equivalent to a resident or fellow in the USA) working in Obstetrics and Gynaecology in the United Kingdom and registered with the Royal College of Obstetricians and Gynaecologists (RCOG) were invited to participate in this study between December 2017 and March 2018. Registration with the RCOG is mandatory for all obstetricians and gynaecologists practicing in the UK. Doctors were sent an email containing information describing the study and a link to an encrypted online questionnaire. We made it clear to the participants in the invitation email that their participation was voluntary and that responses would be both anonymous and untraceable. Informed consent was implied upon return of the survey. Unique surveys were created for each of the grades described and sent as part of the annual RCOG Workforce and Welfare survey that collects data about doctors' clinical practice and working patterns. During the survey period, 4 reminders were sent out. All actively practising doctors were included as well as doctors who were on sick leave, maternity leave, or suspended from practice. Exclusion criteria included doctors who are fully retired, on a career break, in between jobs, not working in the UK at the time of the survey or those who are currently not employed.

The Survey

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We used a cross-sectional survey design with three participant groups: consultants, SAS doctors and trainees. We estimate that the time taken to complete the questionnaire was 20 minutes.

All participants were asked to provide information on demographic variables, including age, gender, ethnicity (Office of National Statistics classification(47)), relationship status and if they have children. In addition, they were asked about some job and organisational factors such as rota design and career or retirement plans which were tailored to the participant group. These parameters were chosen based on previous studies suggesting that they have an association with burnout.(48) The main outcomes and measures – the Maslach Burnout Inventory Human Services Survey for Medical Personnel(49) (MBI), defensive medical practice questionnaire and questions concerning wellbeing were the same for all groups. A copy of the survey (excluding the copyright restricted MBI) can be found in eMethods in the Supplement.

Main Outcomes and Measures

Symptoms of Burnout

We measured burnout using the Maslach Burnout Inventory Human Services Survey for Medical Personnel(49) (MBI), a validated 22-item tool to identify and characterise burnout. The MBI has three subscales to evaluate the 3 domains of burnout: emotional exhaustion (EE), depersonalisation (DP), and low personal accomplishment (PA). As in previous studies and according to convention,(10, 48, 49) burnout was defined as high EE (scores of 27 or greater; possible score range from 0-54), and/or high DP (scores of 10 or greater; possible score range from 0-30) as opposed to a total score. The PA score was also measured with low PA defined as scores of 33 or lower (possible score range from 0-48) but this was not used as a criterion for burnout in line with previous published work on the subject.(48)

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Defensive Medical Practice

DMP was assessed using a 12-item questionnaire which has previously been developed and described.(40, 42) Items are measured on a 5-point Likert scale (ranging from never to often). Nine items quantify 'hedging' behaviour, which is when doctors are overcautious, leading to overprescribing or over-investigation. 3 items quantify 'avoidance' behaviour, which includes not taking on complicated patients and avoiding certain procedures or more difficult cases. We confirm this factor structure in eMethods in the Supplement. Consistent with previous work, we defined elevated hedging behaviour as a score of 13 or more (possible score range from 0-36), and elevated avoidance behaviour as a score of 5 or more (possible score range from 0-12).(40) We defined any DMP as having elevated levels of avoidance and/or hedging.

Doctor Wellbeing

Doctors were asked to self-report on the presence or absence (yes or no) of a variety of common medical symptoms and conditions including, cardiovascular problems, gastro-intestinal problems, headaches, minor colds, recurring respiratory infections, depression, anxiety, anger and irritability, suicidal thoughts, sleep problems, relationship problems, and alcohol/drug misuse.

Statistical Analyses

Spearman correlations between the MBI and DMP subscales and DMP were calculated. In order to investigate the association between burnout, DMP, and wellbeing, we calculated odds ratios based on univariable logistic regression with Firth bias correction. Multivariable logistic regression with Firth bias correction was used to investigate the association between demographic variables and burnout, with results reported as adjusted

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odds ratios and visualised with a nomogram. The predictors of burnout in this analysis were age, gender, ethnicity, grade, having children, current relationship, medical degree (MD) origin (UK or Ireland vs. other), and work status (full time vs. less than full time). A similar multivariable analysis was performed with DMP as the dependent variable. For this model, the same predictors were used, with burnout added as an additional predictor.

For the logistic regression analyses, missing values were singly imputed using the method of fully conditional specification based on the abovementioned list of predictors, the MBI subscales (as numerical scores), and the DMP subscales (as numerical scores).

R version 3.5.0 was used for the statistical analysis.

Patient and Public Involvement

This research was designed and conducted without patient and public involvement.

Results

Respondent Characteristics

The survey was sent to a total of 5661 doctors. The overall response rate was 54.8% (3102/5661). We received questionnaires from 1481 consultants (53% of 2786 consultants contacted), 1364 trainees (57% of 2375 trainees contacted), and 257 SAS doctors (51% of 500 contacted). Of these, 1462 consultants, 1357 trainees, and 254 SAS doctors were actively practising and included in the analysis. The mean age was 50 years for consultants, 33 years for trainees, and 47 years for SAS doctors (Table 1). A majority of doctors were female (58% of the consultants, 80% of the trainees, 68% of the SAS doctors). Consultants (57%) and trainees (64%) were predominantly white, whereas SAS doctors were most often of Asian ethnicity (42%). Descriptive statistics by demographic variables are presented in Table 2. Information on missing data is presented in eTable 1 in the Supplement.

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We were unable to reliably check if our sample for all doctors was representative of the entire population to whom the study survey was sent with regards to age, gender and ethnicity as the RCOG do not a hold a centralised database of these variables for all doctors against which to compare our data. However, the RCOG sent a different survey (Training Evaluation Form (TEF)) to 1956 trainees in January 2018, which was responded to by 1754 trainees (89.7%) (eTable 2 in the Supplement).(50) When comparing our data to this survey, we found that our trainee sample was comparable in terms of gender (79.1% females in the TEF database compared to 79.8% in our cohort). Furthermore our study population had similar numbers of trainees in the 20-29 and 30-39 age ranges (28.3% and 62.3% respectively in the TEF database compared to 24.8% and 66.1% respectively in our database). Our trainee cohort consisted of more doctors in the 40-59 age range (9.1% compared to 6.1% in the TEF database) which may be accounted for by missing data in the TEF database. In terms of ethnicity, our sample was also comparable for all groups.

Burnout

Regarding the MBI, the percentage of participants meeting the criteria for burnout was 36% overall (1116/3073; 95% confidence interval (CI) 35% to 38%); 31% for consultants (460/1462; 95% CI 29% to 34%), 43% for trainees (580/1364; 95% CI 40% to 45%), and 30% for SAS doctors (76/254; 95% CI 25% to 36%) (Table 1 and eFigure 1 in the Supplement). Between 26% and 32% met the criteria for high EE, between 12% and 29% met the criteria for high DP, and between 26% and 39% met the criteria for low PA. The EE and DP scales had a Spearman correlation of 0.57, whereas both subscales correlated negatively with PA (-0.30 and -0.34, respectively) (eTable 3).

Defensive Medical Practice

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Increased DMP, according to our criteria, was observed in 13% overall (400/3073); 16% of consultants (231/1462), 11% of trainees (149/1364), and 8% of SAS doctors (20/254). Between 4% and 9% met our criteria for increased avoidance, and between 4% and 11% met our criteria for increased hedging. These subscales had a Spearman correlation of 0.41 (eTable 3 and eFigure 1 in the Supplement).

Of all participants who met the criteria for burnout, 23% met the criteria for increased DMP (258/1116) (Table 3). Of participants who did not meet the criteria for burnout, 7% reported increased DMP (142/1957). The crude odds ratio (OR) was 3.84 (95% CI 3.08 to 4.79). The relationship was similar for all categories of doctors, and was observed for avoidance as well as hedging behaviour (Table 3 and eTable 4 in the supplement).

Doctor Wellbeing

Doctors with burnout had a higher prevalence of self-reported medical illness (Table 4). Highest odds ratios were observed for suicidal thoughts (6.37, 95% CI 3.95 to 10.7), depression (4.05, 95% CI 3.26 to 5.04), anxiety (3.59, 95% CI 3.07 to 4.21), anger/irritability (3.51, 95% CI 3.00 to 4.10), sleep problems or insomnia (3.15, 95% CI 2.70 to 3.67) and substance misuse (2.57, 95% CI 1.71-3.89). 13.5% (n=416) of all doctors reported depression, but this was 7.4% for doctors without burnout and 24.4% for doctors with burnout. Furthermore, 2.9% (n=90) of all doctors reported suicidal thoughts, 1.0% among doctors without and 6.3% among doctors with burnout. The OR was lowest for cardiovascular problems (1.38, 95% CI 1.07 to 1.78).

Risk factors and correlates

Results of the multivariable models are presented in Table 5 and eFigure 2 in the Supplement. Age, ethnicity, and origin of MD degree were most strongly related to burnout.

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The older the doctor, the lower the reported level of burnout (adjusted OR per 5 years 0.92, 95% CI 0.87-0.98) and doctors of white and 'other' ethnicity reported higher levels of burnout (41% and 48% respectively) than doctors of other ethnicities (28 to 34%). Doctors with a medical degree from the UK or Ireland also reported higher levels of burnout (42% vs 25%, adjusted OR 1.74, 95% CI 1.41 to 2.16).

Regarding any DMP, burnout was the strongest predictor, followed by age, type of doctor, and ethnicity. The adjusted OR of burnout to predict increased DMP was 4.35 (95% CI 3.46 to 5.49). Consultants, doctors of mixed ethnicity, and to a lesser extent older doctors, reported the highest levels of DMP.

Discussion

In this large nationwide study, we have shown that just under half of trainees and a third of consultants and SAS doctors working in obstetrics and gynaecology in the UK suffer from burnout using the MBI scoring system. Furthermore, our data suggest that burnout is associated with higher levels of defensive medical practice, and with poorer mental and physical wellbeing.

The overall prevalence of burnout in this study is consistent with smaller international studies conducted within obstetrics and gynaecology (28, 29, 51) but lower than reported in the United States. (2, 52, 53) This may be explained by differences in the way burnout has been measured, the small number of subjects included in some studies, differences in healthcare systems as well as medical training, and the hours of work in the UK which are restricted by the European Working Time Directive. A lack of personal accomplishment and emotional exhaustion were the most commonly endorsed subscales, followed by depersonalisation. The particularly high levels of burnout amongst younger doctors, of

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whom the majority are trainees, may provide insights into a recent RCOG national training and workforce report.(54) In this, nine out of ten O&G trainees reported feeling low in mood, depressed or anxious since starting specialty training(54). In keeping with this finding, and with a number of American studies,(48, 55) our data indicates that burnout is associated with a negative impact on doctor wellbeing and is strongly associated with depression, anxiety and suicidal thoughts.

Our study reported a particularly strong relationship between burnout and suicidal thoughts; worryingly, suicidal ideation has been shown to be strongly associated with actual suicide attempts and death (56). Furthermore, suicide rates in doctors are known to be much higher than for the general population(57). A study of surgeons in the USA (58) found the prevalence of suicidal ideation in this group to be 6.3%; although this is higher than the prevalence in this study (2.9%), we found the association between burnout and suicidal ideation to be higher (odds ratio, 6.37 versus 1.910 (58)) in our cohort. This may reflect a vulnerability amongst doctors working in O&G compared to other specialties(28, 29) or the differences in healthcare services and culture internationally.

Studies in the USA have indicated an association between burnout and increased workforce turnover(59) which has both financial implications and an impact on healthcare organisation productivity. The RCOG national workforce report(54) has reported that three quarters of trainees have considered leaving O&G practice. In our study, as well as the highest prevalence of burnout amongst trainees, almost a fifth of trainees reported depression and over a third reported anxiety. These symptoms were markedly more prevalent in the cohort with burnout and depression has been shown to be independently associated with an increased self-reported likelihood of leaving practice amongst surgeons.(60) Better understanding the relationship between burnout, wellbeing and staff turnover intentions is

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of great importance to ensure retention of the workforce going forward. This knowledge will also help to inform the content of interventions aimed at identifying and preventing burnout, and improving the wellbeing and retention of doctors early in their careers (61). The majority of interventions proposed to date have been individual-focused strategies which include mindfulness(62), personal coping strategies and exercise (63), or some combination of these. However, a recent meta-analysis of interventions to reduce doctor burnout found that organisation-directed interventions (such as reducing workload, changing rota/shift patterns, or group sessions to enhance teamwork) had a more significant effect on reducing burnout than individual approaches alone(23). This highlights the importance of implementing organisational strategies(64, 65) along with continual assessment of burnout, to develop a healthy workplace environment to effectively tackle this problem(5).

Our finding that burnout is associated with increased DMP supports the concern that doctor burnout impacts the quality of patient care.(34) In 2010, Shanafelt et al. al(19) showed that burnout is an independent predictor of self-reported perceived major medical errors. Our study shows that consultants with burnout are three times more likely to report both avoidance (avoiding cases or procedures) and hedging (overprescribing or over-referral) which may have significant and serious consequences on patient care. This may be because consultants are less 'protected' than trainees in terms of litigation as they take ultimate responsibility for a patient's care. Furthermore, due to their seniority, they are likely to have experienced more complaints or adverse events during their careers, which have been shown to be associated with DMP(42). The observation in our study that age is inversely associated with burnout is also in keeping with other studies.(66) This may be explained by the fact that doctors who remain within the specialty are inherently more resilient, and that those more affected by burnout may be accounted for in the attrition rate from the

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specialty(67). It has also been suggested that the lower rate of burnout seen in more senior doctors is because they may have a better work-life balance and career (67, 68). A further noteworthy association in our cohort was that after controlling for other confounding variables, doctors from ethnic minorities were less likely to experience burnout. Similar findings have been reported in studies of trainees and medical students in the USA(69-71) however the reasons for this are unknown. It has been proposed that that these differences may be explained by differences in upbringing and life stressors, which may make doctors from ethnic minorities more resilient(69). Consistent with this, we found that doctors who graduated in the UK or Ireland are almost twice as likely to experience burnout.

Strengths and weaknesses of our study are important to consider in contrast with other research on the prevalence of burnout in doctors. A strength of the study is that it is a nationwide survey which includes a large number of doctors and is the first study to our knowledge that seeks to explore the relationship between burnout (using a validated tool, the MBI) and defensive medical practice. There were several limitations to the present study. Firstly, although the overall response rate was only 54.8% which is a relatively high response rate for a survey study of this type, it still introduces the possibility of selection bias, which must be considered when interpreting the findings. We believe however that the response rate quoted is the minimum rate and is likely to under-report the response rate from practising clinicians (eDiscussion in the Supplement). Secondly, it is plausible that individuals most affected by burnout may have avoided engaging with the survey and conversely those least impacted may not have seen its value which could bias the results. Thirdly, we asked doctors to self-report on medical conditions including depression and anxiety and the questionnaire used to assess DMP, although used in previous studies (40-42), has not been formally validated. Finally, a limitation of a cross-sectional survey study is

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that it cannot take into account variability of symptoms over time, which may be influenced by other factors such as time of the year and other personal factors.

Conclusions

Our nationwide study reports high levels of burnout amongst obstetricians and gynaecologists in the UK, and that burnout is more prevalent in younger doctors who have trained in the UK. Furthermore, our data suggest that burnout is strongly associated with anxiety, depression, suicidal thoughts and substance misuse. This highlights the impact of burnout on the efficiency and sustainability of the O&G medical workforce, which confirms the need to regularly assess and mitigate burnout in doctors. We have also observed an association between burnout and defensive medical practice, which has implications for the quality and safety of patient care being delivered as well as the wellbeing and retention of staff in the NHS. Ultimately, cultivating a greater understanding of doctor burnout and its implications has strategic importance for the sustainability of the NHS workforce and will add to the body of evidence required to improve productivity and patient safety outcomes more broadly across the UK.

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Footnotes

Author Contributions: TB had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: TB, CL, AW, LR

Acquisition, analysis, and interpretation of data: TB, HS, NF, DT, CL, AW, MAL, LR, BVC

Drafting of the manuscript: TB, HS, BVC

Critical revision of the manuscript for important intellectual content: TB, HS, NF, DT, CL, AW, MAL, LR, BVC

Statistical analysis: NF, BVC

Obtained funding: TB

TB is the guarantor and attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the

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submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Ethical Approval: The survey was sent to doctors registered with the Royal College of Obstetricians and Gynaecologists via their email database. The Chair of the RCOG Ethics Committee (Vivienne Nathanson) reviewed the study proposal and confirmed that ethical approval was not required. This was due to the fact that the data collected about doctors was via an encrypted online questionnaire and participants were informed that their participation was voluntary and that responses would be both anonymous and untraceable. Informed consent was implied on return of the survey.

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Transparency: The lead author (TB) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and any discrepancies from the study as planned have been explained.

Data sharing statement: No additional data is available at present. Any queries to be submitted to the corresponding author at t.bourne@imperial.ac.uk.

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Tables

Table 1. Descriptive statistics by doctor category.

	Consultants N=1481	SAS[a] N=257	Trainees N=1364
Actively practising	1462 (99%)	254 (99%)	1357 (99%)
If actively practising[b]:			
Age, mean (range)	50 (33-73)	47 (27-74)	33 (25-58)
Female	831 (58%)	171 (68%)	1067 (80%)
Ethnicity			
White	831 (57%)	79 (31%)	857 (64%)
Asian	438 (30%)	106 (42%)	288 (21%)
Black	88 (6%)	23 (9%)	90 (7%)
Mixed	58 (4%)	26 (10%)	88 (7%)
Other	37 (3%)	19 (8%)	26 (2%)
Children	1267 (87%)	198 (78%)	585 (43%)
Relationship	1269 (87%)	216 (85%)	979 (72%)
Qualified in UK/Ireland	865 (59%)	42 (17%)	1089 (80%)
Full time	1276 (87%)	211 (83%)	1064 (79%)
Subspecialty (consultants)			
None	1278 (87%)	N/A	N/A
Maternal/Fetal medicine	56 (4%)	N/A	N/A
Sexual/reproductive health	34 (2%)	N/A	N/A
Gynaecological oncology	33 (2%)	N/A	N/A
Reproductive medicine	33 (2%)	N/A	N/A
Urogynaecology	28 (2%)	N/A	N/A
Maslach Burnout Inventory			
Emotional exhaustion			
Mean	19.9 (0-54)	18.7 (0-53)	21.9 (0-54)
High[c] (%)	411 (28%)	65 (26%)	440 (32%)
Depersonalisation			
Mean	4.5 (0-29)	4.5 (0-30)	7.0 (0-29)
High[d] (%)	178 (12%)	33 (13%)	394 (29%)
Personal accomplishment			
Mean	37.2 (0-48)	35.3 (4-48)	34.6 (0-48)
Low[e](%)	382 (26%)	95 (37%)	530 (39%)
Burnout[f]	460 (31%)	76 (30%)	580 (43%)
Defensive medical practice			
Avoidance			
Mean	1.4 (0-12)	1.1 (0-12)	0.9 (0-10)
Elevated[g] (%)	125 (9%)	13 (5%)	58 (4%)
Hedging			
Mean	5.2 (0-36)	2.8 (0-36)	4.6 (0-36)
Elevated[h] (%)	164 (11%)	11 (4%)	114 (8%)
Any defensive medical practice[i]	231 (16%)	20 (8%)	149 (11%)

[a] SAS: Specialty and Specialty Associate Doctors

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[b] Results for each variable are based on available data, i.e. excluding participants with a missing value. Gender has the most missing values, 41/3073 (1.3%). Missing values for all variables are reported in eTable1 in the Supplement.

[c] Scores of ≥27 (range 0-54) are considered high and indicate burnout in accordance with the Maslach Burnout Inventory

[d] Scores of ≥10 (range 0-30) are considered high and indicate burnout in accordance with the Maslach Burnout Inventory

[e] The score range is 0-48; scores ≤33 are defined as low personal accomplishment

[f] Positive for burnout if emotional exhaustion and/or depersonalisation scores high (as defined) in accordance with the Maslach Burnout Inventory

[g] Scores of ≥13 (range 0-36) are considered elevated and indicate avoidance behaviour

[h] Scores of ≥5 (range 0-12) are considered elevated and indicate hedging behaviour

[I] Defined as elevated levels of avoidance and/or hedging behaviour

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Table 2. Descriptive statistics of Burnout and Defensive Medical Practice stratified by demographic variables.

	Burnout[a] (%)	Avoidance[b] (%)	Hedging[c] (%)	Any DMP[d,e] (%)
Age (years)				
<35 (n=948)	440 (46%)	37 (4%)	93 (10%)	115 (12%)
35-49 (n=1209)	395 (33%)	68 (6%)	114 (9%)	151 (12%)
≥50 (n=916)	281 (31%)	91 (10%)	82 (9%)	134 (15%)
Gender				
Female (n=2069)	763(37%)	105 (5%)	179 (9%)	239 (12%)
Male (n=963)	332 (34%)	87 (9%)	102 (11%)	152 (16%)
Ethnicity				
White (n=1767)	723 (41%)	114 (6%)	159 (9%)	227 (13%)
Asian (n=832)	229 (28%)	49 (6%)	79 (9%)	105 (13%)
Black (n=201)	57 (28%)	10 (5%)	17 (8%)	21 (10%)
Mixed (n=172)	59 (34%)	14 (8%)	23 (13%)	31 (18%)
Other (n=82)	39 (48%)	3 (4%)	7 (9%)	8 (10%)
Children				
No (n=1023)	473 (46%)	48 (5%)	96 (9%)	126 (12%)
Yes (n=2050)	643 (31%)	148 (7%)	193 (9%)	274 (13%)
Relationship				
No (n=601)	266 (44%)	32 (5%)	51 (8%)	74 (12%)
Yes (n=2464)	844 (34%)	161 (7%)	237 (10%)	323 (13%)
Country of Qualification				
United Kingdom/Ireland (n=1996)	841 (42%)	125 (6%)	193 (10%)	265 (13%)
Other (n=1075)	273 (25%)	71 (7%)	96 (9%)	135 (13%)
Work status				
Full Time (n= 2551)	952 (37%)	161 (6%)	248 (10%)	341 (13%)
Less Than Full Time (n=519)	163 (31%)	35 (7%)	41 (8%)	59 (11%)
Subspecialty (consultants)				
None (n=1278)	404 (32%)	116 (9 %)	151 (12%)	213 (17%)
Maternal/Fetal (n=56)	20 (36%)	3 (5%)	7 (12.5%)	8 (14%)
Sexual/Reproductive health (n=34)	10 (29%)	0 (0%)	1 (3%)	1 (3%)
Gynaecological oncology (n=33)	8 (24%)	0 (0%)	1 (3%)	1 (3%)
Reproductive medicine (n=33)	9 (27%)	2 (6%)	0	2 (6%)
Urogynaecology (n=28)	9 (32%)	4 (14%)	4 (14 %)	6 (21%)

[a] Positive for burnout if emotional exhaustion score ≥27 (range 0-54) and/or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[b] Defined as avoidance score of ≥13 (range 0-36)
[c] Defined as hedging score of ≥5 (range 0-12)
[d] DMP: Defensive Medical Practice
[e] Defined as presence of avoidance and/or hedging (as defined)

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Table 3. Descriptive statistics of defensive practice by burnout status

Doctor category	Avoidance[a]		Hedging[b]		Any DMP[c,d]
Burnout status[e]	**Mean score**	**% Elevated**	**Mean score**	**% Elevated**	**%**
Consultant					
No burnout (n=1002)	1.05	53 (5%)	3.95	67 (7%)	101 (10%)
Burnout (n=460)	2.14	72 (16%)	7.79	97 (21%)	130 (28%)
SAS[f]					
No burnout (n=178)	0.72	3 (2%)	1.74	2 (1%)	5 (3%)
Burnout (n=76)	1.92	10 (13%)	5.34	9 (12%)	15 (20%)
Trainees					
No burnout (n=777)	0.59	15 (2%)	3.30	25 (3%)	36 (5%)
Burnout (n=580)	1.38	43 (7%)	6.46	89 (15%)	113 (19%)
All doctors					
No burnout (n=1957)	0.84	71 (4%)	3.49	94 (5%)	142 (7%)
Burnout (n=1116)	1.73	125 (11%)	6.93	195 (17%)	258 (23%)
Odds ratio[g] (95% CI)		3.34 (2.48-4.53)		4.18 (3.24-5.43)	3.84 (3.08-4.79)

[a] Scores of ≥13 (range 0-36) are considered elevated and indicate avoidance behaviour
[b] Scores of ≥5 (range 0-12) are considered elevated and indicate hedging behaviour
[c] DMP: Defensive Medical Practice
[d] Defined as elevated levels of avoidance and/or hedging behaviour
[e] Burnout defined as an emotional exhaustion score ≥27 (range 0-54) and/or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[f] SAS: Specialty and Specialty Associate Doctors
[g] Odds ratios are based on univariable logistic regression with Firth bias correction

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Table 4. Descriptive statistics of self-reported wellbeing, and odds ratios (with 95% Confidence Intervals (CI)) with burnout

	All (n=3073)		Grade		
	N (%)	Odds ratio[a] (95% CI)	Consultants, N (%)	SAS[b], N (%)	Trainees, N (%)
Cardiovascular problems	261 (8)		186 (13)	31 (12)	44 (3)
No burnout	148 (8)	1.38 (1.07-1.78)	114 (11)	20 (11)	14 (2)
Burnout[c]	113 (10)		72 (16)	11 (14)	30 (5)
Gastro-intestinal problems	480 (16)		221 (15)	29 (11)	230 (17)
No burnout	225 (11)	2.28 (1.87-2.78)	111 (11)	14 (8)	100 (13)
Burnout	255 (23)		110 (24)	15 (20)	130 (22)
Depression	416 (14)		141 (10)	41 (16)	234 (17)
No burnout	144 (7)	4.05 (3.26-5.04)	42 (4)	21 (12)	81 (10)
Burnout	272 (24)		99 (22)	20 (26)	153 (26)
Anxiety	1008 (33)		416 (28)	80 (31)	512 (38)
No burnout	439 (22)	3.59 (3.07-4.21)	194 (19)	43 (24)	202 (26)
Burnout	569 (51)		222 (48)	37 (49)	310 (53)
Anger-irritability	1048 (34)		498 (34)	81 (32)	469 (35)
No burnout	465 (24)	3.51 (3.00-4.10)	235 (23)	42 (24)	188 (24)
Burnout	583 (52)		263 (57)	39 (51)	281 (48)
Suicidal thoughts	90 (3)		33 (2)	2 (1)	55 (4)
No burnout	20 (1)	6.37 (3.95-10.7)	5 (0.5)	0	15 (2)
Burnout	70 (6)		28 (6)	2 (3)	40 (7)
Sleep problems / insomnia	1188 (39)		515 (35)	93 (37)	580 (43)
No burnout	563 (29)	3.15 (2.70-3.67)	256 (26)	52 (29)	255 (33)
Burnout	625 (56)		259 (56)	41 (54)	325 (56)
Marital/relationship problems	544 (18)		206 (14)	43 (17)	295 (22)
No burnout	241 (12)	2.65 (2.20-3.20)	105 (10)	20 (11)	116 (15)
Burnout	303 (27)		101 (22)	23 (30)	179 (31)
Frequent headaches	652 (21)		210 (14)	77 (30)	365 (27)
No burnout	317 (16)	2.22 (1.86-2.64)	107 (11)	37 (21)	173 (22)
Burnout	335 (30)		103 (22)	40 (53)	192 (33)
Minor colds	812 (26)		268 (18)	59 (23)	485 (36)
No burnout	449 (23)	1.62 (1.37-1.91)	165 (16)	42 (24)	242 (31)
Burnout	363 (33)		103 (22)	17 (22)	243 (42)
Recurrent respiratory infections	188 (6)		66 (5)	16 (6)	106 (8)
No burnout	81 (4)	2.45 (1.82-3.31)	31 (3)	10 (6)	40 (5)
Burnout	107 (10)		35 (8)	6 (8)	66 (11)
Alcohol/drugs problems	97 (3)		56 (4)	4 (2)	37 (3)
No burnout	40 (2)	2.57 (1.71-3.89)	24 (2)	2 (1)	14 (2)
Burnout	57 (5)		32 (7)	2 (3)	23 (4)

[a] Odds ratio based on univariable Firth corrected logistic regression of wellbeing item vs burnout with stratification for group (consultant, SAS, trainee)

[b] SAS: Specialty and Specialty Associate Doctors

[c] Burnout defined as an emotional exhaustion score ≥27 (range 0-54) and/or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory

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Table 5. Univariable and multivariable logistic regression results (using Firth bias correction).

	Burnout[a]		Any DMP[b]	
Predictor variable	**Crude OR[c]**	**Adjusted OR**	**Crude OR**	**Adjusted OR**
Grade (versus consultants)				
SAS[d]	0.93 (0.70; 1.24)	1.14 (0.83; 1.55)	0.47 (0.28; 0.73)	0.40 (0.23; 0.65)
Trainees	1.63 (1.39; 1.90)	1.00 (0.77; 1.31)	0.66 (0.53; 0.82)	0.47 (0.32; 0.70)
Age (per 5 years)	0.87 (0.84; 0.90)	0.92 (0.87; 0.98)	1.04 (0.99; 1.09)	0.93 (0.85; 1.02)
Female (versus male)	1.12 (0.95; 1.31)	0.97 (0.81; 1.16)	0.70 (0.56; 0.87)	0.70 (0.55; 0.89)
Ethnicity (versus white)				
Asian	0.54 (0.45; 0.65)	0.74 (0.60; 0.91)	0.98 (0.77; 1.25)	1.15 (0.85; 1.54)
Black	0.57 (0.41; 0.78)	0.73 (0.51; 1.02)	0.79 (0.48; 1.24)	0.90 (0.53; 1.47)
Mixed	0.75 (0.54; 1.03)	0.82 (0.58; 1.15)	1.53 (1.01; 2.27)	1.89 (1.21; 2.89)
Other	1.37 (0.88; 2.12)	2.19 (1.37; 3.52)	0.84 (0.40; 1.59)	0.64 (0.29; 1.30)
Children	0.53 (0.46; 0.62)	0.78 (0.64; 0.97)	1.10 (0.88; 1.38)	1.03 (0.75; 1.41)
Current relationship	0.65 (0.54; 0.78)	0.87 (0.70; 1.07)	1.06 (0.82; 1.40)	1.07 (0.79; 1.46)
Medical Qualification from United Kingdom/Ireland (vs other country)	2.13 (1.81; 2.51)	1.74 (1.41; 2.16)	1.06 (0.85; 1.33)	0.84 (0.63; 1.14)
Full time (vs Less Than Full Time)	1.30 (1.06; 1.59)	1.28 (1.02; 1.62)	1.19 (0.90; 1.61)	0.91 (0.65; 1.27)
Burnout			3.84 (3.08; 4.79)	4.35 (3.46; 5.49)

[a]Burnout defined as an emotional exhaustion score ≥27 (range 0-54) and/or depersonalisation score ≥10 (range 0-30) in accordance with the Maslach Burnout Inventory
[b]Defensive medical practice (DMP) defined as elevated levels of avoidance and/or hedging behaviour
[c] OR: Odds Ratio
[d] SAS: Specialty and Specialty Associate Doctors

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Supplementary Online Content

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eTable 1. Missing data among actively practicing participants

	Consultants N=1462	SAS[a] N=254	Trainees N=1357
Age, mean (range)	None missing	None missing	None missing
Gender	19 (1%)	2 (1%)	20 (1%)
Ethnicity	10 (1%)	1 (<1%)	8 (1%)
Parity	None missing	None missing	None missing
Relationship	3 (<1%)	None missing	5 (<1%)
Medical Qualification country of origin	None missing	1 (<1%)	1 (<1%)
Work status (Full Time vs Less Than Full Time)	None missing	1 (<1%)	2 (<1%)
Maslach Burnout Inventory	None missing	None missing	None missing
Defensive practice	None missing	None missing	None missing

[a]SAS: Specialty and Specialty Associate Doctors

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eTable 2. Demographic data of trainees in study and Royal College of Obstetricians and Gynaecologists (RCOG) Training Evaluation Form (TEF) 2018 Survey

	RCOG TEF Database (n=1754) (%)[a]	Trainees (n=1357) (%)
Age		
20-29	497 (28.3%)	336 (24.8%)
30-29	1092 (62.3%)	897 (66.1%)
40-49	106 (6.0%)	115 (8.4%)
50-59	2 (0.1%)	9 (0.7%)
Over 60	0	0
Missing data	57 (3.3%)	0
Female	1387 (79.1%)	1067 (79.8%)
Ethnicity		
White	1108 (63.2%)	857 (63.2%)
Asian	381 (21.7%)	288 (21.2%)
Black	97 (5.5%)	90 (6.6%)
Mixed	83 (4.7%)	88 (6.5%)
Other	68 (3.9%)	26 (1.9%)
Missing data	17 (1%)	8 (0.6%)

[a] RCOG TEF survey sent to 1956 trainees who held a National Training Number and an email address associated with an active ePortfolio at the time of the survey, which is used to assess competencies and training progress. It was responded to by 1754 trainees (89.7% response rate).

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eTable 3. Spearman correlations between Maslach Burnout Inventory and defensive medical practice subscales

	EE[b]	DP[c]	PA[d]	Av[e]	He[f]
MBI[a] – EE	1				
MBI – DP	0.57	1			
MBI – PA	-0.30	-0.34	1		
Av	0.28	0.30	-0.19	1	
He	0.34	0.38	-0.17	0.41	1

[a] MBI: Maslach Burnout Inventory
[b] EE: Emotional Exhaustion
[c] DP: Depersonalization
[d] PA: Personal Accomplishment
[e] Av: Avoidance
[f] He: Hedging

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eTable 4. Descriptive statistics of defensive practice according to each Maslach Burnout Inventory (MBI) subscale

MBI[a] subscales	Avoidance		Hedging		Any DMP[b]
	Mean score	% Elevated	Mean score	% Elevated	%
High emotional exhaustion					
No (n=2157)	0.88	85 (4%)	3.76	125 (6%)	179 (8%)
Yes (n=916)	1.82	111 (12%)	7.05	164 (18%)	221 (24%)
Odds ratio[c] (95% CI)		3.36 (2.51-4.51)		3.54 (2.77-4.54)	3.51 (2.83-4.36)
High depersonalization					
No (n=2468)	0.95	106 (4%)	3.93	159 (6%)	229 (9%)
Yes (n=605)	2.02	90 (15%)	8.06	130 (21%)	171 (28%)
Odds ratio[c] (95% CI)		3.89 (2.89-5.23)		3.97 (3.09-5.11)	3.85 (3.08-4.81)
Low personal accomplishment					
No (n=2066)	0.97	103 (5%)	4.19	142 (7%)	202 (10%)
Yes (n=1007)	1.55	93 (9%)	5.87	147 (15%)	198 (20%)
Odds ratio[c] (95% CI)		1.94 (1.45-2.59)		2.31 (1.81-2.96)	2.26 (1.83-2.79)

[a] MBI: Maslach Burnout Inventory
[b] DMP: Defensive Medical Practice
[c] Odds ratios are based on univariable logistic regression with Firth bias correction.

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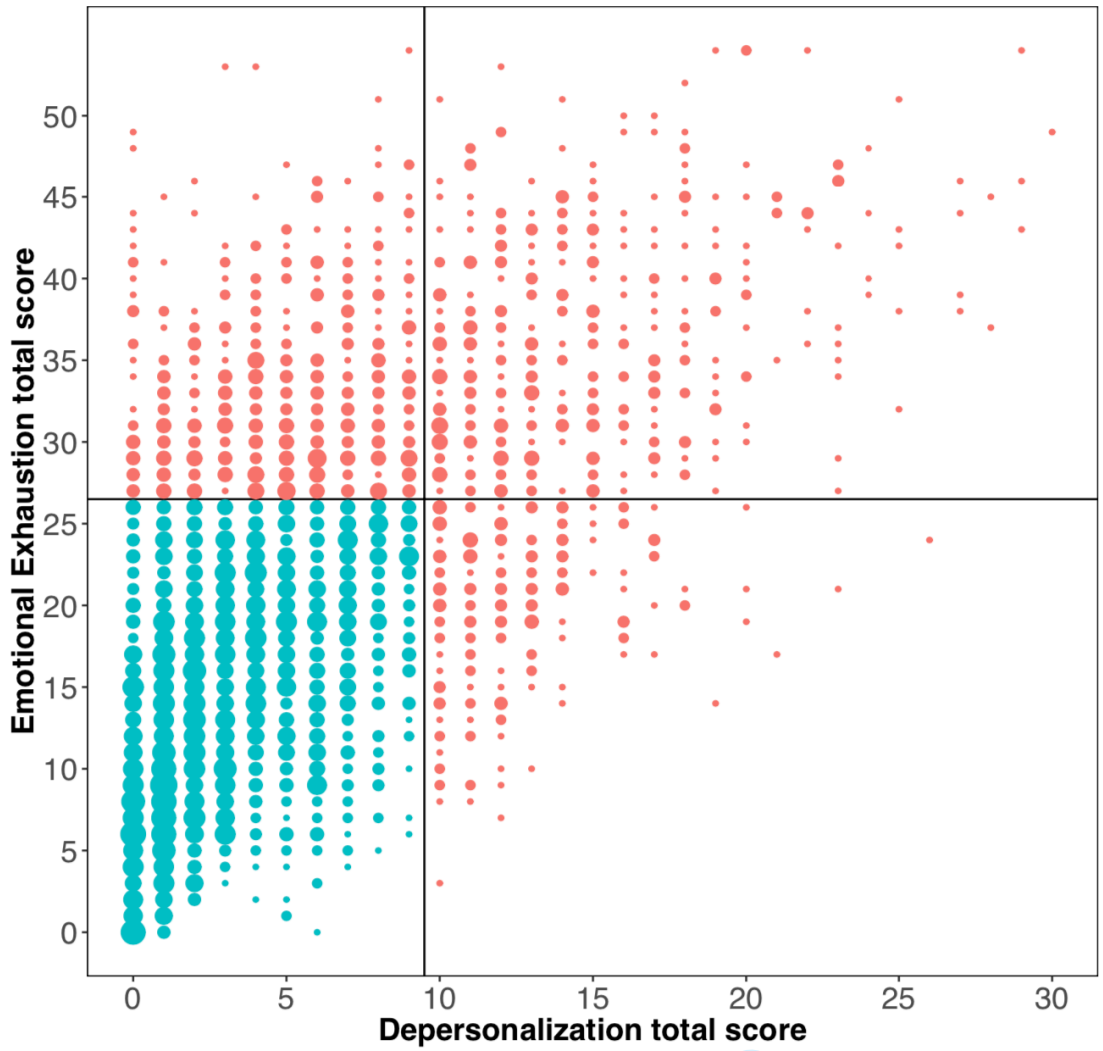
eFigure 1. Scatter plot of Emotion Exhaustion and Depersonalization Maslach Burnout Inventory subscales



The cutoff values used to define burnout (emotional exhaustion ≥27 and depersonalization ≥10) are shown with a line with cases meeting the threshold in red. The size of the dots corresponds to the number of cases with these values.

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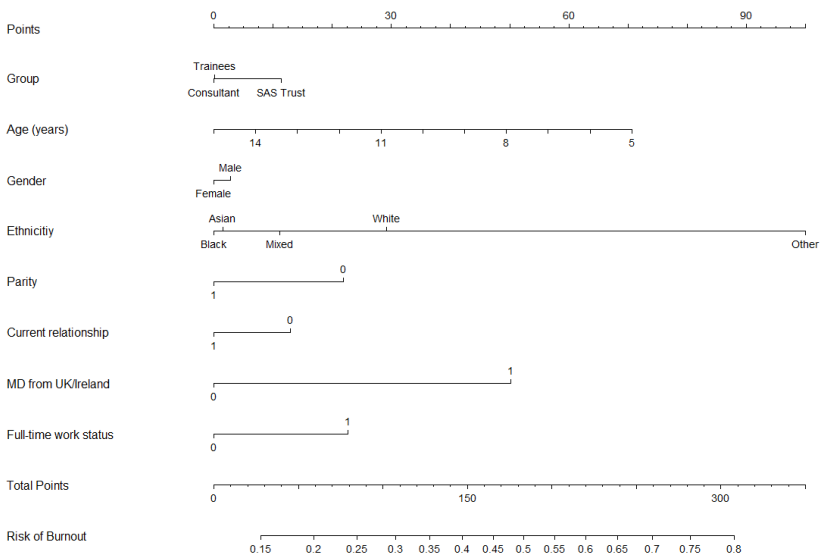
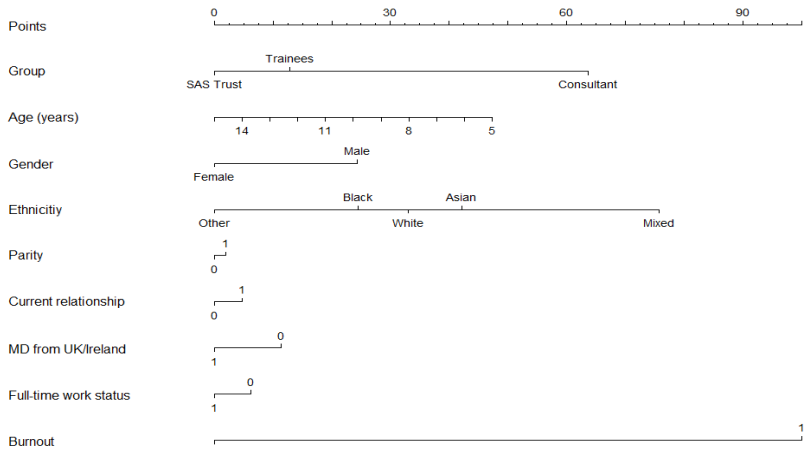
eFigure 2. Nomograms of the multivariable logistic regression models for burnout (A) and any defensive medical practice (B)

A



B



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eDiscussion. Survey response rate amongst trainees

Our survey study was sent to trainees working in Obstetrics and Gynecology in the United Kingdom, registered with the Royal College of Obstetricians and Gynaecologists (RCOG) and identified as trainees on the RCOG main database (n=2375) which is the system from which data is extracted for mailings. This is not however the same list used to distribute the RCOG TEF survey (n=1956, eTable 2 in the Supplement) which is sent to trainees who currently hold a National Training Number and an email address associated with an active ePortfolio, which is used to assess competencies and training progress. In view of this, we believe that a proportion of trainees to whom our survey was sent to (based on being identified as a trainee on the RCOG main database) are likely to have been left on the distribution list, but have in fact subsequently suspended training for a period of time or who are no longer trainees and have not informed the RCOG. These doctors would therefore not have completed the survey. This may account for a proportion of the difference in the numbers of trainees between the mailing list we used and that used for the RCOG TEF survey.

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eMethods. Survey Questionnaire

The survey was sent to three participant groups: consultants, specialty and specialty associate (SAS) doctors and trainees with each receiving a tailored version. The questions are marked accordingly.

We are unfortunately unable to include the Maslach Burnout Inventory questionnaire items as these are copyright restricted.

Section 1: About you

The following questions apply to all doctors:

Age

Gender

- Female
- Male
- Intersex
- Other (Specify)
- I do not wish to disclose

Ethnicity

- Asian/Asian British
  - Bangladeshi
  - British
  - Indian
  - Pakistani
  - Sri Lankan
- Black/African/Caribbean/Black British
  - African
  - British
  - Caribbean
- Mixed/multiple ethnic groups
  - British
  - White & Asian
  - White & Black African
  - White & Black Caribbean
- White (UK & Ireland)
  - British
  - English
  - Irish
  - Northern Irish
  - Scottish
  - Welsh
- Other Ethnic Group
  - Arab
  - Chinese
  - Dutch
  - Egyptian
  - French
  - German
  - Italian
  - Japanese
  - Korean
  - Malaysian
  - Middle Eastern
  - Myanmar
  - Persian
  - Portuguese
  - Romanian
  - Russian
  - Singaporean

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Sri Lankan
Sudanese
Other (Specify)
I do not wish to disclose

Nationality
British
English
Irish
Northern Irish
Scottish
Welsh
American
Australian
Bangladeshi
Barbadian
Canadian
Chinese
Dutch
Egyptian
German
Ghanaian
Greek
Hong Kongers
Indian
Iraqi
Italian
Jamaican
Jordanian
Libyan
Malaysian
Maltese
Mauritian
Myanmar
New Zealander
Nigerian
Pakistani
Polish
Romanian
Singaporean
South African
Sri Lankan
Sudanese
Syrian
Trinidadian
Zimbabwean
Other (Specify)
I do not wish to disclose

Religion or Belief
Atheism
Buddhism
Christianity
Hinduism
Islam
Jainism
Judaism
Quaker
Sikhism
Other (Specify)
No religion
I do not wish to disclose

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Disability
- Yes
- No
- I do not wish to disclose

Do you have children?
- No
- One
- Two
- Three
- Four +
- I do not wish to disclose

In what country did you obtain your primary medical degree?

The following question applies to trainees only:
How many years have you been qualified as a doctor? Number

The following questions apply to SAS doctors only:
Have you ever held a UK National Training Number (NTN)?
- Yes
- No

If no, are you interested in acquiring one?
- Yes
- No
- Other (please specify)

Are you working towards entry on the specialist register through the Certificate of Eligibility for Specialist Registration (CESR)?
- Yes
- No
- No - I am not currently working towards it but am planning to in the future
- No - I am already on the specialist register
- Undecided
- Other (specify)

If you are already on the Specialist Register, have you applied for consultant posts?
- Yes - but not yet successful
- No
- N/A
- Other (please specify)

What category of RCOG membership are you in?
- Associate
- Fellow
- Member

Are you currently involved in College work?
- No
- Yes - examiner
- Yes - committee member
- Yes - advisory group
- Yes - working group
- Not currently - but have been in past or other (please specify)

The following questions apply to consultants only:
In which country was the majority of your specialty training completed
How many years have you been qualified to be a consultant?

Section 2: Your Role
The following questions apply to trainees only:
What best describes your current work status?
- Specialty Trainee (ST)
- Parental leave
- Out of programme (OOP) research
- OOP clinical experience

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OOP career break
OOP teaching
OOP research/teaching
OOP clinical experience/teaching
Academic clinical fellow
Academic clinical lecturer
Subspecialty training (SST) Gynaecological Oncology
SST Maternal and Fetal Medicine
Fixed Term Specialty Training Appointment (FTSTA)
Medical Training Initiative (MTI)
SST Urogynaecology
SST Reproductive Medicine
Clinical Fellow
Other (specify)

Who is your training Local Education and Training Board (LETB)/Deanery?

East of England
Kent, Surrey and Sussex
Merseyside
North Central and East London
North East
North West
North West London
Northern Ireland
Oxford
Scotland
Severn
South London
South West
Thames Valley
Wales
Wessex
West Midlands
Yorkshire and the Humber
Other (specify)

What training level are you at?

ST1
ST2
ST3
ST4
ST5
ST6
ST7
Other (specify)

If relevant, what is your sub-speciality/special interest?

Abortion care/sexual health
Paediatric and adolescent gynaecology
Reproductive medicine/Subfertility
Urogynaecology
Vulval disease
Medical education
Minimal access surgery
Risk management
Patient Safety leadership
Leadership
Acute gynaecology and early pregnancy
Benign gynaecology surgery
Colposcopy and cervical pathology
Fetal Medicine
Gynaecological oncology
High-risk pregnancy and maternal medicine

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Labour ward
Menopause/post-reproductive health
Sub Specialty - Gynaecological oncology
Sub Specialty - Maternal and fetal medicine
Sub Specialty - Reproductive medicine
Sub Specialty - Urogynaecology
Sub Specialty - Sexual and Reproductive Health
N/A
Other (Specify)

Do you do any non-NHS work and/or non O&G work?
Yes
No

The following questions apply to SAS doctors only:

What best describes your current work status?
Actively practising in healthcare outside of O&G
Actively practising in O&G
On a career break/sabbatical
On parental leave
On sick leave
Other (specify)

What job title do you have?
Specialty Doctor
Associate Specialist
Staff grade
Trust Doctor
Trust Registrar
Clinical Fellow
Clinical Assistant
Locum Appointment for Training/Service
Foundation Year 3
Other (Specify)

Why did you take up your current post? (select all that apply)
Geographical Stability
Work-life balance
Regular hours
Pay
Not on Specialist register and unable to get a trainee post
On Specialist register but unable to get a consultant post
No on call
Other (specify)

Who are you contracted to work for?
Pure NHS
Joint NHS with other
Joint NHS/academic - majority NHS funded (e.g. honorary academic post)
Pure academic/research (e.g. paid for by university)
Other (Specify)

Do you work in an NHS teaching (tertiary referral) hospital or a District General Hospital? If neither, please give details.
NHS teaching hospital
District General hospital
Neither - please specify

Are you employed on a contract with nationally agreed terms and conditions?
Yes
No
Don't know

In what areas of O&G do you practice?
Gynaecology only
Obstetrics and Gynaecology
Obstetrics only

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Other (Specify)

Do you have a special interest? (select all that apply)

Fertility
Sexual Health
Early Pregnancy
Acute Gynaecology
Leadership
Labour ward
Antenatal care
Maternal Medicine
Fetal Medicine
Diabetic Pregnancy
Gynae-oncology
Colposcopy
Psychosexual health
Benign Gynaecology
Minimally invasive surgery
Menopause
Gynae ultrasound
Obstetric ultrasound
Maternal Mental health
No
Other (Specify)

Do you currently work at a registrar or consultant level

Consultant level
Registrar level
Both
Other (specify)

Do you do any non-NHS work and/or non O&G work?

No
Yes - Please specify

The following questions apply to consultants only:

What best describes your current work status?

Actively practising in healthcare outside O&G
Actively practising in O&G
On a career break/sabbatical
On parental leave
On sick leave
Retired
Other (Specify)

Who are you contracted to work for? (Yes/No)

Pure NHS
Pure academic/research (e.g paid for by university)
Joint NHS/academic - majority NHS funded (e.g honorary academic post)
Joint NHS/academic - majority academic funded (e.g university with honorary NHS)
Joint NHS with other
Joint academic/research with other
Other (including not currently working)

What is your primary post?

Consultant O&G
Consultant Gynaecologist
Consultant Obstetrician
Locum Consultant
Consultant Sexual & Reproductive Health
Professor
Acting Consultant
Consultant Private Practice
Consultant GUM
Academic Senior Clinical Fellow

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Honorary Consultant
Senior Clinical Lecturer Honorary
Senior Lecturer
Senior Clinical Research Fellow
Emeritus Professor
Other (Specify)

Which would best describe your post?
Special interest
Sub-specialty
Other (Specify)

If relevant, what is your subspecialty/special interest?
Abortion care/sexual health
Acute gynaecology and early pregnancy
Benign gynaecological surgery (office gynaecology, hysteroscopy, etc
Colposcopy and cervical pathology
Fetal medicine
Gynaecological oncology
High risk pregnancy/Maternal medicine
Labour Ward
Menopause/Post reproductive health
Paediatric and adolescent gynaecology
Reproductive medicine/Subfertility
Urogynaecology
Vulval disease
Medical education
Minimal access surgery
Risk management
Patient Safety leadership
Leadership
Sub specialty - Gynaecological oncology
Sub specialty - Maternal and fetal medicine
Sub specialty - Reproductive medicine
Sub specialty - Urogynaecology
Sub specialty - Sexual and reproductive health
N/A
Other (Specify)

Do you do any private work?
Yes
No
N/A
Other (Specify)

Do you hold any of the following leadership roles? (Yes/No)
Clinical Director
Medical Director
Clinical Governance Lead
Labour Ward Lead
Special Interest Lead
Audit Lead
Risk Management Lead
No
Other (specify)

If yes, how are you remunerated for these lead positions (in terms of programmed activities (PAs))?

0.5
1
1.5
2
2.5
3
3.5

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4
4.5
5
6
6.5
7
8
10
Responsibility payment
N/A

Are these included in your weekly job plan, or are they additional?

Yes, Includes
No, additional
Other (Specify)

Section 3: Your Working Patterns and Professional Development

The following questions apply to trainees only:

Do you work full time or less than full time (LTFT)?

Full-Time
LTFT, (50%)
LTFT, (60%)
LTFT, (70%)
LTFT, (80%)
LTFT, (90%)
Other (Specify)

When completing your training do you intend to work full time or LTFT?

LTFT
Work full time
Uncertain
Other (Specify)

What is the on call frequency at your level?

1:1
1:2
1:3
1:4
1:5
1:6
1:7
1:8
1:9
1:10
1:11
1:12
1:14
1:15
1:16
1:18
1:19
1:20
N/A
Other (specify)

What type of middle grade on call rota does your unit have during the day, excluding consultant cover?

Single middle grade on call rota with ST1-2 level cover (including junior cover by other doctors e.g. Foundation & General Practice (GP) trainees)
Single middle grade on call rota without ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)
Two middle grades on call working at the same level with ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)
Two middle grades on call working at the same level without ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)

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Two tier middle grade rota with one senior and one junior middle grade with ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)
Two tier middle grade rota with one senior and one junior middle grade without ST1-2 level cover (including junior cover by other doctors e.g. Foundation & GP trainees)
Other (specify)

Have you ever taken any time out of programme during your training? (Please select all that apply)
OOPT
OOPE
OOPR
OOPC
OOPE/T
OOPR/T
Parental leave
No
Other (please specify)

After you complete training what area of O&G do you intend to practice?
Benign gynaecological surgery (office gynaecology, hysteroscopy, etc.)
Colposcopy and cervical pathology
Fetal medicine
Gynaecological oncology
High risk pregnancy/Maternal medicine
Labour Ward
Menopause/Post reproductive health
Other (specify)

After completion of your training do you intend work resident out of hours?
Yes
No

If you intend to work resident out of hours do anticipate this will be for your entire career?
Early career only
Entire career
Unsure
N/A
Other (specify)

Are you aware of gaps in the rota at your level at your current unit?
Yes
No
N/A

Do you have specialty doctors (SAS, Trust, etc.) supporting your rotas?
Yes
No
N/A

The following questions apply to SAS doctors only:

How many hours/week are you contracted to work?
<20
20-39
40
41-50
>50

Do you work resident out of hours on call?
No
Yes
N/A

If yes, is this first on call, second on call or third on call?
Please specify

If you work resident out of hours do you anticipate this will be your entire career?
Early career only
Entire career
Other - Please specify
N/A

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Do you work non-resident consultant level out of hours on call?

Yes
No
Other - please specify

Does your job plan include at least 4 hours/week (= one session if on programmed activities (PA) contract) for supporting professional activities (SPA)? (SPA = non clinical time for audit, teaching, governance, CPD, appraisal)

Yes
No
Don't know

When on call what areas do you cover?

Gynaecology only
Obstetrics and gynaecology
Obstetrics only
Other (specify)

Do you have an educational supervisor?

Yes
No
Don't know
Other (specify)

Do you work in a formal educational role?

Educational supervisor
Clinical supervisor
Teaching Fellow
SAS Tutor
Other (specify)

Do you have a formal leadership role?

Medical Director
Associate Medical Director
Clinical Director
Audit Lead
Governance Lead
Service Lead
Other (specify)

Are you, or have you ever been, principle investigator (PI) for a research project?

Yes
No
Other (specify)

Are you, or have you ever been, an appraiser?

Yes
If you were but are no longer an appraiser then why did you stop? (specify)
No

If yes, do you appraise consultants?

Yes
No

Do you work autonomously (have your own clinics and/or theatre lists)?

Yes
No

If yes, is this work coded in your own name or a consultants name?

Own
Consultant
Don't know
Other (specify)

The following questions apply to consultants only:

Has your workload increased in the last 12 months?

Yes
No
Other (Specify)

Do you work full time or LTFT?

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Full Time
LTFT, 10%
LTFT, 20%
LTFT, 30%
LTFT, 40%
LTFT, 50%
LTFT, 60%
LTFT, 70%
LTFT, 80%
LTFT, 90%
N/A
Other (Specify)

How many PAs per week are in your job plan?
Number (to nearest 0.5)
N/A
Other - Specify

Number of Direct Clinical Care PAs
Number (to nearest 0.5)
N/A
Other (Specify)

Number of Supporting Professional Activities (SPAs)
Number (to nearest 0.5)
N/A
Other (Specify)

Number of Academic PAs
Number (to nearest 0.5)
N/A
Other (Specify)

Number of other (i.e. education, managerial) PAs
Number (to nearest 0.5)
N/A
Other (Specify)

What is the O&G split of your daytime PAs?
0% Obstetric, 100% Gynaecology
10% Obstetric, 90% Gynaecology
100% Obstetric, 0% Gynaecology
20% Obstetric, 80% Gynaecology
30% Obstetric, 70% Gynaecology
40% Obstetric, 60% Gynaecology
50% Obstetric, 50% Gynaecology
60% Obstetric, 40% Gynaecology
70% Obstetric, 30% Gynaecology
80% Obstetric, 20% Gynaecology
90% Obstetric, 10% Gynaecology
N/A

Would you like to decrease the amount of obstetric work you do?
Yes
No
N/A

Are any of your PAs out of hours (evening, weekend, emergency, on-call etc.)?
Yes
No
N/A

If you work over night on call would you like to reduce this?
Yes
No
N/A

If you work out of hours, what is your PA split?
0% Obstetric, 100% Gynaecology
10% Obstetric, 90% Gynaecology

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100% Obstetric, 0% Gynaecology
20% Obstetric, 80% Gynaecology
30% Obstetric, 70% Gynaecology
40% Obstetric, 60% Gynaecology
50% Obstetric, 50% Gynaecology
60% Obstetric, 40% Gynaecology
70% Obstetric, 30% Gynaecology
80% Obstetric, 20% Gynaecology
90% Obstetric, 10% Gynaecology
N/A

Does your job plan require you to work routinely resident in the hospital outside 'office hours'?
Yes
No
N/A

If yes, are these twilight/weekend day shifts or can they include time after midnight?
Twilight/weekend day shifts only
Include time after midnight
N/A
Other

Who is resident with you usually for twilight/weekend days?
A junior grade (GP trainee, F2)
An O&G trainee (or equivalent) (ST1/ST2)
At least one doctor who is ST3 or higher
N/A
Other (Specify)

Who is resident with you usually for after midnight shifts?
A junior grade (GP trainee, F2)
An O&G trainee (or equivalent) (ST1/ST2)
At least one doctor who is ST3 or higher
N/A
Other (Specify)

Do you plan to reduce sessions as part of your retirement plan?
Yes
No
Don't know
N/A
Other (Specify)

When (what year) do you plan to retire completely from clinical work?
2018-2019
2019-2020
2021-2025
2026-2030
2031-2035
2036-2040
2041-2045
2046-2050
2051-2055
2056-2060

Do you intend to retire and then return to work?
Yes - please specify intended number of sessions
No
Other (Specify)

When on duty are you aware of gaps in the trainee's rotas?
Frequently
Infrequently
Never
Often
N/A

Are you ever required to fill in for absent staff at a lower grade?
Frequently

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Infrequently
Never
Often
N/A

Do you have specialty doctors (SAS, Trust, etc.) supporting your rotas?
Yes
No
N/A

If yes, which of these roles provide this service? (Yes/No)
Associate Specialist
LAS/LATs
Staff Grade
Trust Doctor
Other (Specify)

Do you feel you have a team structure that adequately supports your development and practice needs?

Yes - please explain why
No - please explain why
Don't know
N/A

If yes, can we contact you to obtain a copy of your team structure?
Yes
No
N/A

Section 4: Your Wellbeing

The following questions apply to trainees and SAS doctors only:

Since starting specialty training how often have you thought of leaving O&G/medicine entirely?
Daily
Weekly
Monthly
Occasionally
Never

If you have or would ever consider leaving speciality training what reasons would you give? (Please only tick those that would impact on your decision)
Family
Lack of work-life balance
Pay
Long working hours
Shift working
Intense workload
Rota gaps
Desire to work abroad
Inability to work less than full time
Issues with gaining adequate clinical experience when working less than full time
Preference to work in another geographic area
Preference to work in another specialty
Personal Health
Physical demands of the job
Personal mental health
Stress
Lack of clinical supervision
Poor pastoral support
Poor educational supervision
Low morale
No support from colleagues
No social interaction with colleagues
Commuting distance
Frustration with training
Frustration with health service

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Blame culture
Lack of improvement
Litigation
Fear of litigation
No opportunities to debrief following adverse event or serious incident
No support following adverse event or serious incident
Patient care/safety concerns
Concerns with new contract
Insufficient financial remuneration
Under resourced health service
N/A
Other (Specify)

What are the positive aspects of O&G that you experience and make you want to pursue this as your chosen career? (Please select all that apply)

Unique mix of medicine and surgery
Good communication / team working
Demonstrating your ability to cope well under pressure
Good support from colleagues
Good support from trainers/supervisors
A balanced work intensity that makes the job interesting and enjoyable
Financial remuneration
Sub-Specialty training
Academic training
Research opportunities
Personally fulfilling/rewarding
Challenging (but with appropriate support)
Out of programme opportunities
Ability to work flexibly
Being seen as a valued team member
Don't know
Other (Specify)

Do post-shift rest facilities exist within your hospital (e.g. a sleep off room)?

Yes
No
I don’t know

Have you ever used such facilities?

Yes
No
N/A

If they exist, how easily accessible are these facilities?

Difficult
Don't know
Easy
Some effort
Very difficult
Very easy
N/A

Do you have accessible and adequate rest facilities available during your night shifts (i.e. private area with bedding/comfortable chair)?

Yes
No
I don’t know
N/A

Have you ever used such facilities?

Yes
No
N/A

If they exist, how easily accessible are these facilities?

Difficult
Don't know

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Easy
Some effort
Very difficult
Very easy
N/A

How often do you sleep for at least 30 minutes uninterrupted during a night shift?
About half
Less than half
Most shifts
Never
N/A

How do you normally commute home after a night shift?
Cycle
Drive - car
Drive - motorcycle
Other (Specify)
Public transport
Taxi or equivalent
Walk
N/A

How long does your commute usually take after a night shift?
15-30 minutes
30-60 minutes
< 15 minutes
> 60 minutes
N/A

If applicable, do you ever feel too tired to drive home after a night shift?
Yes
No
N/A

If applicable, have you ever had an accident/near miss when driving home after a night shift?
No
Yes
Prefer not to say
N/A

The following sections apply to all doctors

Section 5: Maslach Burnout Inventory (Copyright Restricted)

Section 6: Defensive Medical Practice

Within the last 6 months, have you ever taken the following actions which you would not have done if you were not worried about possible consequences such as complaints, disciplinary actions by managers, being sued, or publicity in the media? For each of the following, please rate each item on a 5-point Likert scale

Avoidance (3 items)

Avoided a particular type of invasive procedure
Never
Rarely
Sometimes
Quite often
Often

Not accepted "high risk" patients in order to avoid possible complications
Never
Rarely
Sometimes
Quite often
Often

Stopped doing aspects of your job
Never

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Rarely
Sometimes
Quite often
Often

Hedging (9 items)

Prescribed more medications than medically indicated
Never
Rarely
Sometimes
Quite often
Often

Referred to specialists in unnecessary circumstances
Never
Rarely
Sometimes
Quite often
Often

Conducted more investigations or made more referrals than warranted by the patient's condition
Never
Rarely
Sometimes
Quite often
Often

Admitted patients to hospital when the patient could have been discharged home safely or managed as an outpatient
Never
Rarely
Sometimes
Quite often
Often

Asked for more frequent observations to be carried out on a patient than necessary
Never
Rarely
Sometimes
Quite often
Often

Written in patients' records specific remarks such as "not suicidal" which you would not if you were not worried about legal/media/disciplinary consequences
Never
Rarely
Sometimes
Quite often
Often

Written more letters about a patient than is necessary to communicate about the patient's condition

Referred patient for a second opinion more than necessary
Never
Rarely
Sometimes
Quite often
Often

Carried out more tests than necessary
Never
Rarely
Sometimes
Quite often
Often

Section 7: Doctor Wellbeing

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In the past 12 months have you experienced:

Cardio-vascular problems (e.g. high blood pressure, angina, heart attack)
- Yes
- No

Gastro-intestinal problems (e.g. gastritis, irritable bowel syndrome, ulcers)
- Yes
- No

Depression
- Yes
- No

Anxiety
- Yes
- No

Anger & irritability
- Yes
- No

Other mental health problems
- Yes
- No

Suicidal thoughts
- Yes
- No

Sleep problems/insomnia
- Yes
- No

Marital/relationship problems
- Yes
- No

Frequent headaches
- Yes
- No

Minor colds
- Yes
- No

Recurring respiratory infections
- Yes
- No

None of the above
- Yes
- No

Other
- Yes (please specify)
- No

Any additional life stressors (e.g. bereavement, accident etc.)
- Yes – currently (in the last 6 months)
- Yes – in the past (more than 6 months ago)
- No

Have you ever been aware of, or other people raised concerns, that you are drinking too much alcohol or taking (prescribed or non-prescribed) drugs?

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STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6-7
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	7-8
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	N/A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9-10
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9-10
		(*b*) Describe any methods used to examine subgroups and interactions	9-10
		(*c*) Explain how missing data were addressed	9-10
		(*d*) If applicable, explain how loss to follow-up was addressed	9-10
		(*e*) Describe any sensitivity analyses	9-10
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10-11
		(b) Give reasons for non-participation at each stage	10-11
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10-11
		(b) Indicate number of participants with missing data for each variable of interest	10-11
		(c) Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Report numbers of outcome events or summary measures over time	11

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Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-13
		(*b*) Report category boundaries when continuous variables were categorized	11-13
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11-13
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-16
Generalisability	21	Discuss the generalisability (external validity) of the study results	13-16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

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