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Doctors don't Do-little: A national cross-sectional study of workplace wellbeing of hospital doctors in Ireland

Abbreviated title: Doctors don't Do-little

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Keywords: wellbeing, doctor, occupational stress, burnout, work ability

Word count: 3791

Abstract

Objectives: To measure levels of occupational stress, burnout, work-life balance, presenteeism, work ability (balance between work and personal resources) and desire to practise in trainee and consultant hospital doctors in Ireland.

Design: National cross-sectional study of randomised sample of hospital doctors. Participants provided sociodemographic data (age, sex, marital status), work grade (consultant, higher/ basic specialist trainee), specialty, work hours and completed workplace wellbeing questionnaires (Effort Reward Imbalance [ERI] Scale, overcommitment, Maslach Burnout Inventory) and single item measures of work ability, presenteeism, work-life balance and desire to practise.

Setting: Irish publicly funded hospitals and residential institutions.

Participants: 1749 doctors (response rate of 55%). All hospital specialties were represented except radiology.
Results: 29% of respondents had insufficient work ability and there was no sex, age or grade difference. 70.6% reported strong or very strong desire to practise medicine, 22% reported good work-life balance, 79% experienced workplace stress, with effort greatly exceeding reward, exacerbated by overcommitment. Burnout was evident in 30.7% and was significantly associated with male sex, lower desire to practise, lower work-ability, higher presenteeism, higher ERI ratio and greater overcommitment. Apart from the measures of work ability and overcommitment, there was no sex or age difference across any variable. However effort-reward imbalance and burnout were significantly lower in consultants than trainees.

Conclusions: Hospital doctors across all grades in Ireland had low levels of work ability, work-life balance, high levels of work stress and almost one third experienced burnout indicating suboptimal work conditions and environment. Yet, most had high desire to practise medicine. Measurement of these indices should become a quality indicator for hospitals and research should focus on the efficacy of a range of individual and organisational interventions for burnout and occupational stress.

Word count: 282

Strengths and limitations of this study

- This study provides new information on levels of burnout and other indices of workplace wellbeing in a national cohort of hospital doctors in Ireland following a period of substantial cutbacks in health expenditure and workforce depletion
- The utilisation of standard instruments and single item questions previously used elsewhere allows for comparison with other research on doctors
- The use of the effort-reward imbalance (ERI) instrument, encompassing a measure of overcommitment, is particularly apt in a study of doctors
- The good response rate and the range of specialties represented validates the results as being representative
- The study is limited by the fact that it is cross sectional in design and causality cannot be inferred from the associations observed

INTRODUCTION

The links between work and health are well established. Work is good for health as long as certain conditions are met(1). However when work poses excessive demands with little control and support, its impact on both physical and mental health can be negative, leading to stress related disorders, depression and other common mental health issues(2-6). Moreover, there is strong evidence of a causative relationship between effort reward imbalance and poor health(7).

Worldwide, the hospital as a workplace has experienced many changes with growing scientific and technological developments. In The Republic of Ireland, the financial and personnel constraints imposed by the economic recession (2008) translated into greater work volume, tighter deadlines and dissatisfaction of service users(8), with the hospital sector described as 'chaotic', 'over-managed and under-led'(9), and failing to deliver consistently high quality patient care(10). Previous studies show that systemic weaknesses, often contributed to by human error, have contributed to very negative outcomes for patients(11-13), further contributing to a stressful environment for those working to provide care. This situation is further exacerbated by increased medical emigration(14) and a national shortage of nurses and doctors, for whom hospital posts in Ireland are now less attractive(15) at a time of greatest need, with a growing and ageing population and a greater burden of chronic diseases(16).

Previous studies show that longer working hours and low job satisfaction are associated with burnout(17), a syndrome resulting from chronic occupational stress(18) and defined by emotional exhaustion, depersonalisation, and a diminished sense of personal accomplishment(19). Internationally, prevalence of burnout has been reported as high as 52%(20). However comparison of prevalence of burnout in doctors in other studies is challenged by the fact that burnout has been reported both as a continuous and dichotomous variable(19, 21), using different combinations of its constituent domains, variations in specialty and grade composition of the doctor population under study(22-25), and with variable response rates. The growing evidence on the links between burnout and poor care make for a compelling case to try to address the causes, with potential dual benefit to both patients and doctors(26, 27).

This study set out to measure parameters of workplace wellbeing, including occupational stress, overcommitment (coping style characterised by excessive work-related commitment), burnout, work life balance, presenteeism (working through illness or injury), workability (balance between work and personal resources) and desire to practise in a population of hospital doctors in Ireland, to explore differences between grades and to discuss the findings in the context of international trends. The prevalence of psychological wellbeing in hospital doctors in Ireland has previously been described and illustrates significant differences between grades, with junior trainee doctors experiencing greater distress than their senior, consultant colleagues(28). Mean hours worked were 57, with trainees working significantly longer hours than consultants (28). In the context of the challenging psychosocial environment described above, we were also keen to explore workplace wellbeing in this population with a view to identifying work issues affecting workplace wellbeing and helping to guide employers and training bodies towards effective interventions.

METHODS

Design

The study was a national cross-sectional survey of hospital doctors working in the Republic of Ireland.

Sample

The sampling method has been previously described in detail(28). The participants were registered with one of nine national postgraduate medical training bodies in Ireland and included both consultants and trainee doctors in either Basic Specialist Training (BST – equivalent to residency in North America) or Higher Specialist Training (HST– equivalent to fellowship in North America).
Hospital doctors who met the inclusion criteria (fully registered with a postgraduate medical training body and working in the Republic of Ireland as either consultants or trainees in anaesthesia, emergency medicine (EM), medicine, obstetrics and gynaecology (O&G), ophthalmology, paediatrics, pathology, psychiatry and surgery) were stratified and subsequently randomised. The Faculty of Radiology opted out of the study.

Participant involvement

Patients and members of the public were not involved in this study. The professional bodies to which participants were affiliated were consulted in the design of the project and members contributed to a steering group which met on 5 occasions in the lead up to distribution of the questionnaire. Findings have already been disseminated to the participating training bodies by means of oral presentation and electronic communication.

Data collection

The data collection was performed both by post and online in 2014(28). Participants provided data on demographics (age, sex, nationality) employment stage/ grade and years of practising medicine.

Measures

Workload was measured by averaging *hours per week over 2 consecutive working weeks in the past month(28)*.

Single items on desire to practise medicine, presenteeism, work-life balance, and work ability (defined below) were included and all have previously been used in studies of doctors elsewhere(29-31).

Desire to practise was assessed by '*please rate your current desire to practise medicine'* with the option of a 5-level Likert scale (strong desire to regret). This measure was previously used in a cohort of British medical graduates(29).

Presenteeism (working through illness or injury) was assessed using a single statement '*there were occasions when I think I should have taken time off for illness but did not do so*' to which respondents responded with a 5-point Likert scale (strongly agree to strongly disagree). This measure has been similarly used in a population of United States resident physicians(30).

Work-life balance reflects satisfaction and good functioning at work and at home with a minimum of role conflict(32) and was assessed with a single item '*my work schedule leaves me enough time for my family/ personal life*' on a 5-point Likert scale (strongly agree to strongly disagree). This measure has been similarly used in a large survey of United States physicians(24).

Work ability measures the degree to which individuals are able to cope physically and mentally with the demands of work(33). The Work Ability Score (WAS) uses a single item from The Work Ability Index (WAI)(34)'*how would you rate your current work ability compared with your lifetime best*' with numerical response options on an 11 point scale (0-10), where a score < 6 is considered as insufficient work ability(35). This measure has been similarly used in a survey of Dutch hospital doctors(31).

Work stress was assessed using the Effort Reward Imbalance Questionnaire (ERI; 16-items; 4-point Likert scale) on three dimensions: effort (3 items, score: 3-12), reward (7 items, score: 7-28) and overcommitment (6 items, score: 6-24) perceived in one's professional role. The effort-reward (ER) ratio is computed by dividing the score in effort by score in reward, when corrected for the unequal items of effort and reward. An ER value (range 0-

4) close to zero indicates a favourable situation (relatively low effort, relatively high reward), a value of 1 indicates effort reward balance while values beyond 1 indicate a critical condition of high effort spent that is not met by the rewards received or expected. High effort reward imbalance is strongly associated with an increased risk of mental health disorders and with poor self-rated health(7, 36, 37).

Burnout was assessed by the Maslach Burnout Inventory (MBI) and was defined by a high level of emotional exhaustion (EE; the feeling of being emotionally exhausted and overwhelmed by work) combined with either a high level of depersonalisation (DP; the loss of empathy and the emergence of cynicism in one's care for others) or a low level of personal accomplishment (PA; feeling of competence in one's work with people)(19). The 'EE+ 1 rule' has been suggested as the most effective way of diagnosing burnout i.e. scoring high scores on both EE and DP or high scores in EE combined with low scores on PA(38). The MBI is considered to be the Gold Standard for measurement of burnout and has been widely used internationally in studies of doctors(22-25).

In our sample the internal consistency was satisfactory for all scales (Cronbach's α=0.72 – 0.83).

Statistical analyses

All the analyses were performed using commercially available statistical software (SPSS version: IBM SPSS for Windows, version 21.0). Descriptive analyses were performed initially and categorical group differences between consultant, HST and BST groups were tested using Chi-square. Mean differences for continuous variables (e.g. emotional exhaustion) were tested using a one way ANOVA, adjusting for age and sex. Differences across work-related factors in those meeting criteria for burnout and those who did not were analysed using t-tests. Factors associated with meeting the criteria for burnout (binary) were included in a bivariate logistic regression model, with the burnout (binary) set as the dependent variable and age, sex, grade, years of practice, work load, work ability, work life balance, current desire to practise medicine, ERI and overcommitment as independent variables. Bivariate correlation was performed to analyse the association of the independent variables.

Ethics

The study protocol was approved by the Royal College of Physicians of Ireland's (RCPI) Research Ethics Committee in December 2013 (RCPI RECSAF 20).

RESULTS

In total, 1749 physicians participated in the study (response rate=55%, range 33-63% between specialties). The respondents mainly held Irish nationality (85%) and though there was no sex preponderance overall, consultants were predominantly male (61%) and trainees predominantly female. (Table 1)

Work ability

The mean level of work ability for the respondents as a whole was 6.5 (SD=2.0) and a one way ANOVA showed no significant difference in the mean level of work ability between grades (F (2, 1734)=0.437, p=0.646). Overall, 29.2% of respondents indicated an insufficient level of work ability. (Table 1)

Presenteeism

Overall, 78% of the study population indicated that they had engaged in presenteeism. A one way ANOVA revealed significant differences between the groups (F (2, 1737)=6.22, p=0.002) with consultants (75.6%) reporting significantly lower levels of presenteeism than HSTs (80.8%) or BSTs (80.9%) (Table 1).

Work-life balance

When asked if their work situation left them enough time for their family / personal life, only one in five doctors felt this was the case (22.2%) while three in five (59.7%) disagreed with the assertion. A one way ANOVA revealed significant differences between the groups with consultants indicating significantly higher work-life balance (28.3%) compared with HSTs (13.9%) and BSTs (16.5%)(F (2, 1739)=32.6, p <.001) (Table 1).

Desire to Practise

When asked to rate their desire to practise medicine, 70.6% of doctors described it as strong or very strong. Consultants were more likely to rate their desire to practise positively (73%) than both HSTs (71.4%) and BSTs (63.4%). The difference was significant between consultants and BSTs (F(2,1737) = 9.17, p <.001).(Table 1)

Work stress (ERI)

The mean score for effort (ERI) for the whole group was 9.9 (SD=2.0), with significant differences between grades (F=21.98, p< .001), and scores highest for consultants and lowest for BSTs (Table 2).

The mean score for reward for the group was 17.4 (SD=3.9), with significant differences between grades (F=30.9, p<.001) and highest scores for consultants and lowest for HSTs (Table 2).

The mean score for overcommitment for the group was 15.7 (SD=3.5) and there was no difference between the grades on this measure (F=2.87, p=.57). (Table 2)

The effort of work was not balanced by the rewards of work as evidenced by an effort reward ratio in the overall sample of 1.4 (SD=.6). A one way ANOVA revealed significant differences between the grades (F (2,1597)=9.07, p<.001), with effort reward imbalance being higher for HSTs than for BSTs or consultants. (Table 2).

Burnout

Over half (52.3%) of the respondents had high emotional exhaustion (52.3%) and this was more prevalent in BSTs (61%) and less prevalent in consultants (45.7%) (χ^2=49.07, p<.001). The ANOVA confirmed significant differences in mean emotional exhaustion score between the grades (F (2, 1676)=19.59, p<.001). (Table 2)

High depersonalisation was reported in 28.6% of the sample, and this was more prevalent in BSTs (43.3%) and less prevalent in consultants (18.3%) (χ^2=128.07, p<.001). The ANOVA confirmed significant differences in depersonalisation score between the grades (F (2, 1680)=73.57, p<.001). (Table 2)

Low personal accomplishment was reported in 34% of the sample. A higher proportion of consultants expressed low levels of personal accomplishment (40.4%) than HSTs (28.6%) or BSTs (24.7%) (χ^2=44.16, p<.001). The ANOVA confirmed significant differences in personal accomplishment score between the grades (F (2, 1629)=24.03, p<.001). (Table 2)

Using the aforementioned EE+ 1 rule, the overall level of burnout in this population was 31% with significant between-grade differences highlighting a lower prevalence of burnout in consultants (24.4%) than in HSTs (38.1%) and BSTs (38.4%) (χ^2=38.59, p<.001). (Table2)

Factors associated with burnout

Bivariate correlation showed weak to medium correlation between independent variables. When analysing factors associated with criteria for burnout, male sex, lower desire to practise, lower work-ability, higher presenteeism, higher ERI ratio and greater overcommitment were significantly associated with burnout. For consultants, male sex, lower work-ability, higher ERI ratio and overcommitment were significantly associated

with burnout, while for HSTs, male sex, lower work-life balance, higher presenteeism and overcommitment were significantly associated with burnout. For BSTs, male sex, higher ERI ratio and overcommitment were significantly associated with burnout. (Table 3) (See online supplementary file 1 for correlations between independent variables).

DISCUSSION

This national survey of hospital doctors working within a single healthcare system set out to measure levels of workplace wellbeing across grades by assessing occupational stress, burnout, presenteeism, work-life balance, work ability and desire to practise in a group already shown to have high levels of psychological distress.

Occupational stress was reported by four out of five respondents (79%), indicating that the perceived rewards for the group and especially for the HSTs fall well short of the effort exerted. Whilst consultants reported highest levels of effort, rewards were also highest for this group. At the time of the survey, the majority of the consultants were employed on a contract which had been in existence since 1998, with a new, less favourable, contract introduced for new recruits in 2012(39), two years before this study. It remains to be seen whether these changes affect the perceived reward in the group, as the contract did not just have an impact on pay, but also curtailed the rights to engage in private practice, thus affecting autonomy(15). To date there are few studies reported on doctors that have used the ERI, so there is little opportunity for comparison. Thus the present study is a novel contribution to the literature. However, one German study of surgeons found that 25.1% of respondents reported occupational stress, a stark contrast to the 79% in this study(40).

The levels of burnout in our population were also high, evident in nearly a third of respondents and particularly high in trainees. Over 50% of our population had high levels of emotional exhaustion, much higher than in hospital doctors from the United Kingdom, the United States (US) and Australia (22-25). In our sample, burnout was significantly associated with male sex, lower desire to practise, lower work ability, higher presenteeism, higher ERI ratio and overcommitment, but not with years of experience or workload. In spite of the high prevalence of burnout and work stress, over two thirds of doctors expressed desire to continue in their medical career. However, the desire to practise was rated lower than that reported in British doctors where 81% reported a strong or very strong desire to practise medicine(29).

In our sample, trainees reported working significantly more hours than their consultant colleagues which may help to explain the higher prevalence of both occupational stress and burnout in trainees, in line with the literature(28). However, this was not confirmed in the binary analysis in our study. While there is no firm evidence that long hours correlate with poor mental health(41), work hours were previously found to be associated with poor personal wellbeing in this population(28) indicating a possible moderating effect of personal wellbeing on occupational stress.

It is however possible that high workload contributed to reduced work ability, which is associated with reduced job performance(42), increased risk of long term sick leave and early retirement(43). The prevalence of insufficient work ability in our sample was seven times greater (29%) than in a Dutch study where only 4% of doctors rated their work ability as insufficient(31), suggesting that the working conditions of hospital doctors in Ireland are significantly less favourable than in the Netherlands.

Presenteeism was prevalent in over 75% of all doctors and was significantly associated with burnout, in line with a comparable Norwegian study which reported 80% prevalence of presenteeism(44). A somewhat lower prevalence of presenteeism was reported in a study of US residents with senior residents reporting 62% and junior residents 52% prevalence(30). The high levels of presenteeism are perhaps not surprising in an occupational group who, uniquely, in Ireland, are imbued with the responsibility to secure 'cover' for absence, even in the context of acute illness. Indeed, the US study suggests that some of the reasons for presenteeism

include misplaced dedication, reluctance to let down the team and resource issues such as lack of adequate cover due to staff shortages, all of which are evident in Irish healthcare.

This is perhaps further reflected in the poor work-life balance in our sample, with only one in five (22%) having enough time for family/ personal life. Even consultants' 28% prevalence of work-life balance, which was significantly higher than trainees', compares unfavourably with a concurrent US study in which 41%-48.5% of doctors reported satisfactory work-life balance(24, 45).

There has been a recent shift in the focus of research away from simply measuring burnout prevalence to determining what interventions may be effective. It is clear from recent research that while interventions focussing on the doctor as individual can be helpful, those interventions which are focussed on the organisation are much more effective(46, 47). Indeed, the findings of this study seem to indicate the need to critically review the working conditions of hospital doctors in Ireland. Surprisingly, in a milieu where evidence is the key driver of patient treatment, the evidence on the relationship between workplace psychosocial environment and employee health is paid little attention by those who fund and manage healthcare organisations. It is buried under the constant refrain of 'putting the patient first' with little regard for those who are instrumental in providing care.

Strengths and Limitations

As previously reported(28), this study is the first national survey conducted on a cohort of hospital doctors working within the same health system in Republic of Ireland. The results can be taken as largely representative as all but one hospital specialty (radiology) are included. The 55% response rate would be considered high in this population where response rates tend to be low and are declining(48). Moreover, response rates tend to be lower when questionnaires are long and deal with sensitive topics(49). The use of single items for measuring presenteeism, work-life balance, work ability and desire to practise also allows for comparison with international studies. The use of the ERI, which posits that work effort is spent as part of a social contract, reciprocated by obtaining adequate reward, with imbalance between high effort and low reward indicating adverse work conditions, (which in some people can be exacerbated by overcommitment) make it particularly appropriate to measuring occupational stress in the healthcare sector(50). The use of the MBI allows for comparison of burnout with previous studies of the profession.

The observation of highly significant differences between consultants and trainees across almost all measures is a novel aspect of this study and will be helpful in guiding employers and post-graduate training bodies towards possible areas for future intervention.

On the other hand, the cross-sectional design of the study prevents us from determining the causality or directions of the observed associations. In our sample, the percentage of respondents holding Irish nationality was higher than the number of Irish graduates working in hospitals in a contemporaneous report. This may well reflect the fact that Irish nationals are more likely than their non-Irish colleagues to secure competitive consultant and training posts as we did not survey those in non- training service posts or locums (28). Arguably, were these groups to be included, the prevalence of all negative workplace wellbeing measures might well be higher, as they deal with the same demands as their colleagues but with even less support. Nor did we survey interns, the most junior of trainee doctors in the Irish healthcare system, who have been shown to have high levels of emotional exhaustion(51).

Implications

These negative indicators of workplace wellbeing in hospital doctors are deeply troubling but unsurprising considering the timing of this study, which followed several years of cutbacks in the Irish public sector. The

reported prevalence of occupational stress and burnout are likely to have contributed already to the wave of emigration amongst highly trained young doctors.

For those who have stayed at home or are entering the profession, the implications are stark. One in three is likely to experience burnout, and four out of five will suffer significant occupational stress. Low levels of work ability suggest that of those who do remain, many may well retire early or worse, develop health problems which will force them to leave the service prematurely. This represents a significant loss for the Irish State, not only in fiscal terms, when considering the high cost of medical training. More importantly, it likely contributes to the intolerable vacancy rates at consultant level and creates increasing pressure within the system and on their multidisciplinary team colleagues with whom they provide care. Given their association with burnout in our population, it may be worth tracking these simple measures in order to identify target areas for future intervention.

Improving the quality of patient care and reducing the frequency of adverse events are justifiably garnering the attention of researchers and funders but a growing body of evidence is linking these to physician burnout. As a society, we must ask ourselves what kind of doctors we want to care for us and whether it's acceptable to continue to expect them to perform well within a system which demands so much but provides so little support. Bringing the focus to evidence-based interventions to improve working conditions will not only enhance the wellbeing of doctors but will likely have the added benefit of improving patient outcomes. It must be addressed urgently if we are serious about improving the quality of patient care.

Conclusion

Hospital doctors in Ireland have higher levels of burnout measures than their international peers, with occupational stress, work ability, presenteeism, work-life balance and desire to practise all appearing to contribute to this burnout. Their levels of occupational stress are high with effort greatly outweighing reward. They have low levels of work ability when compared with other European doctors and their work-life balance is unfavourable when compared with doctors in the US as are their levels of presenteeism. Levels of burnout and other measures of workplace wellbeing should be monitored as a quality indicator in healthcare with a view to determining whether specific interventions have had a positive impact on their prevalence.

Table 1: Sociodemographic, work and workplace wellbeing (single item) data compared by grade using one-way ANOVA.

	Consultants		HST		BST		Total		(F)p
	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	
Sex									
Male	574	60.4%	178	21%	130	34.7%	882	50.4%	
Female	375	39.5%	245	57.8%	244	65.1%	864	49.4%	
Age									
30 and under			82	19.3%	267	71.2%	349	20%	
31-40	114	12%	318	75%	97	25.9%	529	30.2%	
41-50	440	46.3%	20	4.7%	9	2.4%	469	26.8%	
51 and over	389	40.9%	2	.5%			391	22.4%	
Work load									
Mean	*54.17*	*15.09*	*61.08*	*15.47*	*59.63*	*13.02*	*57*	*7.74*	*F=38.4****
Years of practice									
Mean	*12.11*	*7.26*	*3.31*	*1.96*	*1.69*	*.86*	*15.08*	*7.26*	*F=665.27****
Work Ability Score									
Insufficient	267	28.1%	126	29.7%	118	31.5%	511	29.2%	
Sufficient	683	71.9%	298	70.3%	257	68.5%	1238	70.8%	
Mean	*6.5*	*2.1*	*6.4*	*2.1*	*6.4*	*2.0*	*6.5*	*2.0*	*F=0.44^{NS}*
Presenteeism									
Strongly agree	342	36.2%	200	47.4%	151	40.6%	693	39.8%	
Agree	373	39.4%	141	33.4%	150	40.3%	664	38.2%	
Neutral	70	7.4%	24	5.7%	23	6.2%	117	6.7%	
Disagree	118	12.5%	44	10.4%	37	9.9%	199	11.4%	
Strongly disagree	43	4.5%	13	3.1%	11	3%	67	3.9%	
Mean	*2.1*	*1.16*	*1.88*	*1.10*	*1.94*	*1.06*	*2.01*	*1.13*	*F=6.22***
Work life balance									
Strongly disagree	147	15.6%	122	28.8%	78	20.9%	347	19.8%	
Disagree	353	37.4%	180	42.5%	164	43.9%	697	39.9%	
Neutral	177	18.8%	63	14.9%	70	18.7%	310	17.7%	
Agree	237	25.1%	54	12.7%	57	15.2%	348	19.9%	
Strongly agree	30	3.2%	5	1.2%	5	1.3%	40	2.3%	
Mean	*2.63*	*1.11*	*2.15*	*1.02*	*2.32*	*1.01*	*2.45*	*1.09*	*F=32.49****
Desire to practise medicine									
Very strong	260	27.4%	101	23.8%	78	20.8%	439	25.2%	
Strong	430	45.3%	201	47.4%	158	42.1%	789	45.3%	
Lukewarm	197	20.7%	89	21%	98	26.1%	384	22.1%	
Weak	41	4.3%	14	3.3%	14	3.7%	69	4%	
Regret	17	1.8%	18	4.2%	24	6.4%	59	3.4%	
Mean	*2.07*	*.9*	*2.17*	*.97*	*2.32*	*1.05*	*2.15*	*.96*	*F=9.17****

****=p ≤ .01 ***=p ≤ .001**

Table 2: Workplace wellbeing scales (ERI, MBI) compared by grade using one-way ANOVA/ Pearson's Chi square.

	Consultants		Higher Specialist Trainees		Basic Specialist Trainees		Total		χ^2(F) p
	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	
Effort Reward Imbalance (ERI)									
Effort mean	*10.1*	*2.0*	*9.8*	*1.9*	*9.3*	*1.9*	*9.9*	*2.0*	21.98***
Reward mean	*18.0*	*3.7*	*16.3*	*3.9*	*17.0*	*3.8*	*17.4*	*3.9*	30.87***
Overcommitment mean	*15.8*	*3.8*	*16.2*	*3.5*	*15.7*	*3.5*	*15.7*	*3.5*	2.87^{NS}
ERI ratio	*1.4*	*0.5*	*1.5*	*0.6*	*1.4*	*0.5*	*1.4*	*0.6*	F=9.07***
Maslach Burnout Inventory (MBI)									
Emotional Exhaustion (EE)									
Low	212	23.5%	52	12.6%	40	11.0%	304	18.1%	
Moderate	278	30.8%	117	28.3%	102	28.0%	497	29.6%	
High	412	45.7%	244	59.1%	222	61.0%	878	52.3%	49.1***
Mean	*25.5*	*11.7*	*28.5*	*10.3*	*29.3*	*10.2*	*27.1*	*11.0*	*19.6****
Depersonalisation (DP)									
Low	479	53.0%	145	34.9%	95	26.0%	719	42.7%	
Moderate	259	28.7%	111	26.7%	112	30.7%	482	28.6%	
High	165	18.3%	159	38.3%	158	43.3%	482	28.6%	128.1***
Mean	*7.4*	*5.7*	*10.6*	*7.0*	*11.6*	*6.7*	*9.1*	*6.5*	*73.6****
Personal Accomplishment (PA)									
Low	351	40.4%	114	28.6%	90	24.7%	555	34%	44.2***
Moderate	303	34.9%	141	35.4%	135	37%	579	35.5%	
High	215	24.7%	143	35.9%	140	38.4%	498	30.5%	
Mean	*36.1*	*7.1*	*33.9*	*7.7*	*33.3*	*7.0*	*34.9*	*7.3*	*24.03****
Burnout (EE+1)									
	232	24.4%	161	38.1%	144	38.4%	537	30.8%	38.59***

*****=p ≤ .001 ^{NS}=not significant**

Table 3 Factors associated with burnout (Binary logistic regression).

		All		Consultants		HST		BST	
		Wald	***Exp(B) (95% C.I.)***	**Wald**	***Exp(B) (95% C.I.)***	**Wald**	***Exp(B) (95% C.I.)***	**Wald**	***Exp(B) (95% C.I.)***
Sex	Male	22.07***	*1.90 (1.46-2.49)*	9.19**	*1.86 (1.24-2.77)*	6.11**	*1.94 (1.15-3.27)*	6.32**	*2.02 (1.17-3.51)*
Age Group (Ref.Cat:31-40 years)		22.61***		0.15ns		5.29ns		8.71**	
	30 and under	15.29***	*1.98 (1.41-2.78)*			2.7ns	*1.71 (0.9-3.25)*	8.71**	*2.64 (1.39-5.03)*
	41-50	2.33ns	*0.73 (0.49-1.09)*	0.15ns	*0.88 (0.48-1.64)*	2.4ns	*0.32 (0.08-1.35)*	0ns	
	51 and over	0.51ns	*0.78 (0.4-1.53)*	0.08ns	*0.89 (0.38-2.08)*				
Years of practice		0.93ns	*0.98 (0.94-1.02)*	0.72ns	*1.02 (0.98-1.06)*	0.61ns	*0.95 (0.83-1.08)*	1.71ns	*0.8 (0.57-1.12)*
Work load		2.53ns	*1.01 (0.98-1)*	1.51ns	*1.01 (1-1.02)*	0ns	*1 (0.98-1.75)*	0.83ns	*1.01 (0.99-1.03)*
Desire to practise		5.13*	*1.18 (1.02-1.35)*	2.04ns	*1.17 (0.95-1.44)*	3.38ns	*1.31 (0.98-1.02)*	1.03ns	*1.15 (0.88-1.49)*
Work life balance		2.12ns	*0.9 (0.78-1.04)*	0.47ns	*0.93 (0.76-1.14)*	3.72*	*0.74 (0.54-1.01)*	0.07ns	*1.04 (0.77-1.41)*
Work-ability		10.13***	*0.89 (0.83-0.96)*	6.97**	*0.88 (0.8-0.97)*	1.62ns	*0.91 (0.79-1.05)*	1.8ns	*0.9 (0.78-1.05)*
Presenteeism		6.14*	*0.85 (0.74-0.97)*	0.71ns	*0.92 (0.77-1.11)*	8.98**	*0.66 (0.51-0.87)*	0.48ns	*0.91 (0.7-1.19)*
ERI-Ratio (ERI)		11.05***	*1.57 (1.2-2.04)*	4.43*	*1.55 (1.03-2.33)*	0.88ns	*1.25 (0.79-1.98)*	6.88**	*2.15 (1.21-3.81)*
Overcommitment (ERI)		60***	*1.19 (1.14-1.24)*	32.33***	*1.2 (1.13-1.28)*	16.78***	*1.2 (1.1-1.32)*	9.6**	*1.15 (1.05-1.26)*
Constant		36.71***	*0.02*	21.61***	*0.01*	4.03*	*0.06*	9.86**	*0.01*
Nagelkerke R Square			**29.1%**		**25.9%**		**32.4%**		**30.6%**

ERI – The Effort Reward Imbalance Questionnaire; MBI – Maslach Burnout Inventory; ns – not significant *p≤0.05; **p≤0.01; ***p≤0.001

References

1. Working for a Healthier Tomorrow London: 2008.
2. Karasek RA, Jr. Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. Administrative Science Quarterly. 1979;24(2):285-308.
3. Theorell T, Karasek RA. Current issues relating to psychosocial job strain and cardiovascular disease research. Journal of Occupational Health Psychology. 1996;1(1):9-26.
4. Bonde JP. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. Occup Environ Med. 2008;65(7):438-45.
5. Stansfeld S, Candy B. Psychosocial work environment and mental health—a meta-analytic review. Scandinavian Journal of Work, Environment & Health. 2006;32(6):443-62.
6. Nieuwenhuijsen K, Bruinvels D, Frings-Dresen M. Psychosocial work environment and stress-related disorders, a systematic review. Occupational Medicine. 2010;60(4):277-86.
7. Stansfeld SA, Fuhrer R, Shipley MJ, Marmot MG. Work characteristics predict psychiatric disorder: Prospective results from the Whitehall II Study. Occup Environ Med. 1999;56.
8. Thomas S, Burke S, Barry S. The Irish health-care system and austerity: sharing the pain. Lancet. 2014;383(9928):1545-6.
9. Hourihane AM. Losing patience with an unhealthy system. Irish Times. 2013 April 27th
10. Rafter. The Irish National Adverse events study (INAES): the frequency and nature of adverse events in Irish hospitals - a retrospective record review study. bmj quality and safety. 2015.
11. West MB, Carol S; Dawson, Jeremy F; Scully, Judy; Carter, Matthew ; Anelay, Stephen; Patterson, Malcolm G; Waring, Justin. The link between the management of employees and patient mortality in acute hospitals. International Journal of Human Resource Management. 2002;13(8):1299-310.
12. The Stationery Office. THE LOURDES HOSPITAL INQUIRY:An Inquiry into peripartum hysterectomy at Our Lady of Lourdes Hospital, Drogheda. Dublin: 2006 https://health.gov.ie/wp-content/uploads/2014/05/lourdes.pdf
13. Health Service Executive. Investigation of Incident 50278 from time of patient's self referral to hospital on the 21st of October 2012 to the patient's death on the 28th of October, 2012. June 2013 https://archive.org/details/713210-hse-report-into-death-of-savita-halappanavar
14. Humphries N MS, Matthews A, Brugha R. Emigration is a matter of self-preservation. The working conditions . . . are killing us slowly': qualitative insights into health professional emigration from Ireland. Human resources for health. 2015;13.
15. Hayes B, Fitzgerald D, Doherty S, et al. Quality care, public perception and quick-fix service management: a Delphi study on stressors of hospital doctors in Ireland. *BMJ Open* 2015;5:e009564. doi: 10.1136/bmjopen-2015-009564
16. Cullen P. Brain drain warning over work conditions for consultants. Irish Times. 12/10/2013.
17. Amoafo E, Hanbali N, Patel A, Singh P. What are the significant factors associated with burnout in doctors? Occup Med (Lond). 2015;65(2):117-21.
18. Bianchi R, Schonfeld IS, Laurent E. Is it Time to Consider the "Burnout Syndrome" A Distinct Illness? Front Public Health. 2015;3:158.
19. Maslach C, Leiter, M.P. and Schaufeli, W.B. Measuring burnout, in Cooper, C.L. and Cartwright, S. (Eds), The Oxford Handbook of Organizational Wellbeing, Oxford University Press, Oxford, pp. 86-108.: Oxford University Press; 2008.
20. O'Kelly F, Manecksha RP, Quinlan DM, Reid A, Joyce A, O'Flynn K, et al. Rates of self-reported 'burnout' and causative factors amongst urologists in Ireland and the UK: a comparative cross-sectional study. BJU Int. 2016;117(2):363-72.
21. Prins JT, Gazendam-Donofrio SM, Tubben BJ, van der Heijden FM, van de Wiel HB, Hoekstra-Weebers JE. Burnout in medical residents: a review. Med Educ. 2007;41(8):788-800.
22. Sharma A, Sharp DM, Walker LG, Monson JR. Stress and burnout in colorectal and vascular surgical consultants working in the UK National Health Service. Psychooncology. 2008;17(6):570-6.
23. Shanafelt TD, Balch CM, Bechamps GJ, Russell T, Dyrbye L, Satele D, et al. Burnout and career satisfaction among American surgeons. Ann Surg. 2009;250(3):463-71.
24. Shanafelt TD, Boone S, Tan L, Dyrbye LN, Sotile W, Satele D, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. Arch Intern Med. 2012;172(18):1377-85.
25. National mental health survey of doctors and medical students. Australia: 2013.

26. Tait D. Shanafelt CMB, Gerald Bechamps, Tom Russell,, Lotte Dyrbye DS, Paul Collicott,Paul J. Novotny, Jeff Sloan,, and Julie Freischlag. Burnout and Medical Errors Among American Surgeons. Archives of Internal Medicine. 2010;172(18):1377-85.
27. Carolyn S Dewa DL, Sarah Bonato, Lucy Trojanowski. The relationship between physician burnout and quality of healthcare in terms of safety and acceptability: a systematic review. BMJ Open. 2017;7(6).
28. Hayes B, Prihodova L, Walsh G, et al. What's up doc? A national cross-sectional study of psychological wellbeing of hospital doctors in Ireland. *BMJ Open* 2017;7:e018023. doi: 10.1136/bmjopen-2017-018023
29. Cohort study of 2006 medical graduates. 2015 June 2015.
30. Jena AB, Baldwin BC, Daugherty SR et al. Presenteeism among resident physicians (letter). JAMA 2010;304(11):1166-68.
31. Ruitenburg MM, Frings-Dresen MH, Sluiter JK. The prevalence of common mental disorders among hospital physicians and their association with self-reported work ability: a cross-sectional study. BMC Health Serv Res. 2012;12:292-8.
32. Creating Balance? International Perspectives on the Work-Life Integration of Professionals. Kaiser S, Ringlstetter MJ, Eikhof DR, Pina e Cunha M, editors.
33. Work Ability Index (2nd Edition). Helsinki: Finnish Institue of Occupational Health, 1998 Contract No.: 2nd Edition.
34. Ilmarinen J. The Work Ability Index (WAI) Occupational Medicine. 2007;57(2).
35. Ilmarinen J. Work ability--a comprehensive concept for occupational health research and prevention. Scand J Work Environ Health. 2009;35(1):1-5.
36. Psychometric properties of the effort-reward imbalance questionnaire. Siegrist J, Li J, Montano D. June 4th 2014.
37. van Vegchel N, de Jonge J, Bosma H, Schaufeli W. Reviewing the effort-reward imbalance model: drawing up the balance of 45 empirical studies. Soc Sci Med. 2005;60(5):1117-31.
38. Brenninkmeijer V, VanYperen N. How to conduct research on burnout: advantages and disadvantages of a unidimensional approach in burnout research. Occupational and Environmental Medicine. 2003;60(Suppl 1):i16-i20.
39. Bohan C. James Reilly: new consultants will have to face a hefty pay cut. The journal. 17/9/2012.
40. von dem Knesebeck O, Klein J, Grosse Frie K, Blum K, Siegrist J. Psychosocial stress among hospital doctors in surgical fields: results of a nationwide survey in Germany. Dtsch Arztebl Int. 2010;107(14):248-53.
41. Maria Cruz Rodriguez-Jareño, Evangelia Demou, Sergio Vargas-Prada, et al. European Working Time Directive and doctors' health: a systematic review of the available epidemiological evidence. *BMJ Open* 2014;4:e004916. doi: 10.1136/bmjopen-2014-004916.
42. Alavinia SM, van den Berg TIJ, van Duivenbooden C et al. Impact of work-related factors, lifestyle, and work ability on sickness absence among Dutch construction workers. Scand J Work Environ Health 2009;35(5):325-33.
43. Sell L, Bültmann U, Rugulies R, et al. Predicting long-term sickness absence and early retirement pension from self-reported work ability. Int Arch Occup Environ Health 2009 Oct;82(9):1133-8. 2009;82(9):1133-8.
44. Rosvold EO, Bjertness E. Physicians who do not take sick leave: hazardous heroes? Scand J Public Health. 2001;29(1):71-5.
45. Shanafelt TD, Hasan O, Dyrbye LN, Sinsky C, Satele D, Sloan J, et al. Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014. Mayo Clin Proc. 2015;90(12):1600-13.
46. Colin P West, Liselotte N Dyrbye, Patricia J Erwin, Shanafelt TD. Interventions to prevent and reduce physician burnout:a systematic review and meta-analysis. The Lancet , Volume 388 , Issue 10057 , 2272 - 2281
47. Panagioti M, Panagopoulou E, Bower P, et al. Controlled Interventions to Reduce Burnout in Physicians: A Systematic Review and Meta-analysis. JAMA Intern Med. 2017;177(2):195-295.
48. Thorpe C, Ryan B, McLean SL, Burt A, Stewart M, Brown JB, et al. How to obtain excellent response rates when surveying physicians. Fam Pract. 2009;26(1):65-8.
49. Edwards PJ, Roberts I, Clarke MJ, et al. Methods to increase response to postal and electronic questionnaires. Cochrane database of systematic reviews. 2009;3:MR000008.
50. Effort-reward imbalance at work -theory, measurement and evidence. Dusseldorf, Germany: University of Medical Sociology, 2012.
51. Hannan E et al. Burnout and stress amongst interns in Irish hospitals: contributing factors and potential solutions. Ir J Med Sci 2017;187(2):301-7.

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Data statement

As per the ethics approval, the data will not be shared outside of the participating research institutions. Any sharing of the data beyond the group will be subject to review by the host institution (Royal College of Physicians of Ireland) and to independent research ethics application. Any queries on how to access the dataset should be directed to research@rcpi.ie.

Contributors

All authors met at least one of the criteria recommended by the ICMJE and have agreed on the final version of the manuscript. BH and GW were involved in conceiving and designing the original protocol. BH wrote the first draft of the manuscript. LP, SD, GW and FD contributed to subsequent drafts and FD provided statistical advice.

Conflicts of interest

None

Ethics approval

Research Ethics Committee Royal College of Physicians of Ireland December 2013 (RCPI RECSAF 20).

Supplementary materials – correlations between independent variables

		Work load	Years of practice	Desire to practise medicine	Work life balance	Presenteeism	Work ability	Effort Reward Imbalance (ERI)	Over-commitment (ERI)
All	Work load	1							
	Years of practice	-.103**	1						
	Desire to practise medicine	.035	-.081**	1					
	Work life balance	-.378**	.186**	-.171**	1				
	Presenteeism	-.081**	.100**	-.125**	.254**	1			
	Work ability	-.130**	.071**	-.381**	.335**	.210**	1		
	Effort Reward Imbalance (ERI)	.200**	-.095**	.282**	-.409**	-.305**	-.375**	1	
	Overcommitment (ERI)	.179**	-.081**	.223**	-.433**	-.300**	-.364**	.442**	1
Consultants	Work load	1							
	Years of practice	0.06	1						
	Desire to practise medicine	0.01	-.042	1					
	Work life balance	-.346**	.136**	-.137**	1				
	Presenteeism	-.053	.079*	-.155**	.267**	1			
	Work ability	-.131**	.103**	-.384**	.332**	.215**	1		
	Effort Reward Imbalance (ERI)	.196**	-.138**	.302**	-.422**	-.328**	-.364**	1	
	Overcommitment (ERI)	.191**	-.113**	.225**	-.480**	-.305**	-.354**	.453**	1
HST	Work load	1							
	Years of practice	-.018	1						
	Desire to practise medicine	.016	.059	1					
	Work life balance	-.401**	-.099*	-.168**	1				
	Presenteeism	-0.028	0.011	-.038	.194**	1			
	Work ability	-.142**	0	-.341**	.315**	.139**	1		
	Effort Reward Imbalance (ERI)	.186**	.101*	.216**	-.369**	-.234**	-.364**	1	
	Overcommitment (ERI)	.167**	.022	.167**	-.385**	-.295**	-.363**	.420**	1
BST	Work load	1							
	Years of practice	-.159**	1						

Desire to practise medicine	.054	-.062	1					
Work life balance	-.312**	.025	-.221**	1				
Presenteeism	-.154**	-.021	-.130*	.231**	1			
Work ability	-.102	.043	-.418**	.379**	.277**	1		
Effort Reward Imbalance (ERI)	.185**	-.124*	.334**	-.415**	-.330**	-.426**	1	
Overcommitment (ERI)	.141**	-.028	.289**	-.348**	-.279**	-.398**	.447**	1

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes
Objectives	3	State specific objectives, including any prespecified hypotheses	Yes
Methods			
Study design	4	Present key elements of study design early in the paper	Yes
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Yes (this paper refers to previous paper already published in BMJ Open [ref 28) which sets out greater detail of methodology
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes
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	Yes
Bias	9	Describe any efforts to address potential sources of bias	Yes
Study size	10	Explain how the study size was arrived at	Yes (see item 6)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes
		(*b*) Describe any methods used to examine subgroups and interactions	Yes
		(*c*) Explain how missing data were addressed	See supp file
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in	Yes, see ref 28 (prev

		the study, completing follow-up, and analysed	paper)
		(b) Give reasons for non-participation at each stage	N/A
		(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	Yes
		(b) Indicate number of participants with missing data for each variable of interest	Yes
Outcome data	15*	Report numbers of outcome events or summary measures	Yes
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	Yes
		(*b*) Report category boundaries when continuous variables were categorized	Yes
		(*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	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Yes
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	Yes
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes
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	Yes

*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 www.strobe-statement.org.

BMJ Open

Doctors don't Do-little: A national cross-sectional study of workplace wellbeing of hospital doctors in Ireland

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Doctors don't Do-little: A national cross-sectional study of workplace wellbeing of hospital doctors in Ireland

Abbreviated title: Doctors don't Do-little

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Keywords: wellbeing, doctor, occupational stress, burnout, work ability

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Abstract

Objectives: To measure levels of occupational stress, burnout, work-life balance, presenteeism, work ability (balance between work and personal resources) and desire to practise in trainee and consultant hospital doctors in Ireland.

Design: National cross-sectional study of randomised sample of hospital doctors. Participants provided sociodemographic data (age, sex), work grade (consultant, higher/ basic specialist trainee), specialty, work hours and completed workplace wellbeing questionnaires (Effort Reward Imbalance [ERI] Scale, overcommitment, Maslach Burnout Inventory) and single item measures of work ability, presenteeism, work-life balance and desire to practise.

Setting: Irish publicly funded hospitals and residential institutions.

Participants: 1749 doctors (response rate of 55%). All hospital specialties were represented except radiology.
Results: 29% of respondents had insufficient work ability and there was no sex, age or grade difference. 70.6% reported strong or very strong desire to practise medicine, 22% reported good work-life balance, 82% experienced workplace stress, with effort greatly exceeding reward, exacerbated by overcommitment. Burnout was evident in 30.7% and was significantly associated with male sex, lower desire to practise, lower work-ability, higher presenteeism, higher ERI ratio and greater overcommitment. Apart from the measures of work ability and overcommitment, there was no sex or age difference across any variable. However effort-reward imbalance and burnout were significantly lower in consultants than trainees.

Conclusions: Hospital doctors across all grades in Ireland had ***insufficient*** work ability, low levels of work-life balance, high levels of work stress and almost one third experienced burnout indicating suboptimal work conditions and environment. Yet, most had high desire to practise medicine. Measurement of these indices should become a quality indicator for hospitals and research should focus on the efficacy of a range of individual and organisational interventions for burnout and occupational stress.

Word count: 281

Strengths and limitations of this study

- This study provides new information on levels of burnout and other indices of workplace wellbeing in a national cohort of hospital doctors in Ireland following a period of substantial cutbacks in health expenditure and workforce depletion
- The utilisation of standard instruments previously used elsewhere allows for comparison with other research on doctors
- The use of the effort-reward imbalance (ERI) instrument, encompassing a measure of overcommitment, is particularly apt in a study of doctors
- The good response rate and the range of specialties represented validates the results as being representative
- The study is limited by the fact that it is cross sectional in design and causality cannot be inferred from the associations observed

INTRODUCTION

The links between work and health are becoming established. Work is good for health as long as certain conditions are met(1,2). However when work poses excessive demands with little control and support, its impact on both physical and mental health can be negative, leading to stress related disorders, depression and other common mental health issues(3-7). Moreover, there is growing evidence that the relationship between effort reward imbalance and poor mental health may be causative (8,9).

Worldwide, the hospital as a workplace has experienced many changes with growing scientific and technological developments. In The Republic of Ireland, the financial and personnel constraints imposed by the economic recession (2008) translated into greater work volume, tighter deadlines and dissatisfaction of service users(10), with the hospital sector described as 'chaotic', 'over-managed and under-led'(11), and failing to deliver consistently high quality patient care(12). Previous studies show that systemic weaknesses, often contributed to by human error, have contributed to very negative outcomes for patients(13-15), further contributing to a stressful environment for those working to provide care. This situation is further exacerbated by increased medical emigration(16) and a national shortage of nurses and doctors, for whom hospital posts in Ireland are now less attractive(17) at a time of greatest need, with a growing and ageing population and a greater burden of chronic diseases(18).

Previous studies show that longer working hours and low job satisfaction are associated with burnout(19), a syndrome resulting from chronic occupational stress(20) and defined by emotional exhaustion, depersonalisation, and a diminished sense of personal accomplishment(21). Internationally, reported prevalence of burnout in doctors has been highly variable with comparison challenged by the fact that it has been reported both as a continuous and dichotomous variable(21-23), using different combinations of its constituent domains, variations in specialty and grade composition of the doctor population under study(24-28), and with variable response rates. A recent systematic review found overall burnout prevalence in doctors ranged from 0-80.5% (22). The growing evidence on the links between burnout and poor care make for a compelling case to try to address the causes, with potential dual benefit to both patients and doctors(29, 30).

The prevalence of psychological wellbeing in hospital doctors in Ireland has previously been described and illustrates significant differences between grades, with junior trainee doctors experiencing greater distress than their senior, consultant colleagues(31). Mean hours worked (57 per week) may be a factor with trainees working significantly longer hours than consultants (31). In the context of the challenging psychosocial environment described above, we were also keen to explore workplace wellbeing in this population with a view to identifying work issues affecting workplace wellbeing and helping to guide employers and training bodies towards effective interventions. This study set out to measure parameters of workplace wellbeing, including occupational stress, overcommitment (coping style characterised by excessive work-related commitment), burnout, work- life balance, presenteeism (working through illness or injury), workability (balance between work and personal resources) and desire to practise in a population of hospital doctors in Ireland, to explore differences between grades and to discuss the findings in the context of international trends.

METHODS

Design

The study was a national cross-sectional survey of hospital doctors working in the Republic of Ireland.

Sample

The sampling method has been previously described in detail(31). The participants were registered with one of nine national postgraduate medical training bodies in Ireland and included both consultants and trainee doctors in either Basic Specialist Training (BST – equivalent to residency in North America) or Higher Specialist Training (HST– equivalent to fellowship in North America).

Hospital doctors who met the inclusion criteria (fully registered with a postgraduate medical training body and working in the Republic of Ireland as either consultants or trainees in anaesthesia, emergency medicine (EM), medicine, obstetrics and gynaecology (O&G), ophthalmology, paediatrics, pathology, psychiatry and surgery) were stratified and subsequently randomised. The Faculty of Radiology opted out of the study. Whilst no patients or public representatives were involved in the study design, the study was overseen by a stakeholder group with medical representatives from various specialties and grades.

Data collection

The data collection was performed both by post and online in 2014(31). Participants provided data on demographics (age, sex, nationality) employment stage/ grade and years of practising medicine.

Measures

Workload was measured by averaging *hours per week over 2 consecutive working weeks in the past month(28)*.

Single items on desire to practise medicine, presenteeism, work-life balance, and work ability (defined below) were included and all have previously been used in studies of doctors elsewhere(31-34).

Desire to practise was assessed by '*please rate your current desire to practise medicine'* with the option of a 5-level Likert scale (strong desire to regret). This measure was previously used in a cohort of British medical graduates(32).

Presenteeism (working through illness or injury) was assessed using a single statement '*there were occasions when I think I should have taken time off for illness but did not do so*' to which respondents responded with a 5-point Likert scale (strongly agree to strongly disagree). This measure has been similarly used in a population of United States resident physicians(33).

Work-life balance reflects satisfaction and good functioning at work and at home with a minimum of role conflict(35) and was assessed with a single item '*my work schedule leaves me enough time for my family/ personal life*' on a 5-point Likert scale (strongly agree to strongly disagree). This measure has been similarly used in a large survey of United States physicians(26).

Work ability measures the degree to which individuals are able to cope physically and mentally with the demands of work(36). The Work Ability Score (WAS) uses a single item from The Work Ability Index (WAI)(37)'*how would you rate your current work ability compared with your lifetime best'* with numerical response options on an 11 point scale (0-10), where a score < 6 is considered as insufficient work ability(38). This measure has been similarly used in a survey of Dutch hospital doctors(34).

Work stress was assessed using the Effort Reward Imbalance Questionnaire (ERI; 16-items; 4-point Likert scale) on three dimensions: effort (3 items, score: 3-12), reward (7 items, score: 7-28) and overcommitment (6 items, score: 6-24) perceived in one's professional role(39). The effort-reward (ER) ratio is computed by dividing the score in effort by score in reward, when corrected for the unequal items of effort and reward. An ER value (range 0-4) close to zero indicates a favourable situation (relatively low effort, relatively high reward), a value

of 1 indicates effort reward balance while values beyond 1 indicate a critical condition of high effort spent that is not met by the rewards received or expected. High effort reward imbalance is strongly associated with an increased risk of mental health disorders and with poor self-rated health(8,9, 39, 40). The percentage of the population in whom effort was not balanced by reward was calculated to determine a crude estimate of the prevalence of occupational stress, albeit the cut-off for ER does not represent a clinically validated threshold(39,41).

Burnout was assessed by the Maslach Burnout Inventory (MBI) and was defined by a high level of emotional exhaustion (EE; the feeling of being emotionally exhausted and overwhelmed by work) combined with either a high level of depersonalisation (DP; the loss of empathy and the emergence of cynicism in one's care for others) or a low level of personal accomplishment (PA; feeling of competence in one's work with people)(21). The 'EE+ 1 rule' has been suggested as the most effective way of identifying burnout i.e. scoring high scores on both EE and DP or high scores in EE combined with low scores on PA(42). The MBI is considered to be the Gold Standard for measurement of burnout and has been widely used internationally in studies of doctors(24-28).

In our sample the internal consistency was satisfactory for all scales (Cronbach's α=0.72 – 0.83).

Statistical analyses

All the analyses were performed using commercially available statistical software (SPSS version: IBM SPSS for Windows, version 21.0). Descriptive analyses were performed initially and categorical group differences between consultant, HST and BST groups were tested using Chi-square. Mean differences for continuous variables (e.g. emotional exhaustion) were tested using a one way ANOVA, adjusting for age and sex. Differences across work-related factors in those meeting criteria for burnout and those who did not were analysed using t-tests. Factors associated with meeting the criteria for burnout (binary) were included in a bivariate logistic regression model, with the burnout (binary) set as the dependent variable and age, sex, grade, years of practice, work load, work ability, work- life balance, current desire to practise medicine, ERI and overcommitment as independent variables. Bivariate correlation was performed to analyse the association of the independent variables.

Patient and Public Involvement

This study explored workplace wellbeing in doctors. Whilst no patients or public representatives were involved in the study design, the study was overseen by a stakeholder group with medical representatives from various specialties and grades.

Ethics

The study protocol was approved by the Royal College of Physicians of Ireland's (RCPI) Research Ethics Committee in December 2013 (RCPI RECSAF 20).

RESULTS

In total, 1749 physicians participated in the study (response rate=55%, range 33-63% between specialties). The respondents mainly held Irish nationality (85%) and though there was no sex preponderance overall, consultants were predominantly male (61%) and trainees predominantly female. (Table 1)

Work ability

The mean level of work ability for the respondents as a whole was 6.5 (SD=2.0) and a one way ANOVA showed no significant difference in the mean level of work ability between grades (F (2, 1734)=0.437, p=0.646). Overall, 29.2% of respondents indicated an insufficient level of work ability. (Table 1)

Presenteeism

Overall, 78% of the study population indicated that they had engaged in presenteeism. A one way ANOVA revealed significant differences between the groups (F (2, 1737)=6.22, p=0.002) with consultants (75.6%) reporting significantly lower levels of presenteeism than HSTs (80.8%) or BSTs (80.9%) (Table 1).

Work-life balance

When asked if their work situation left them enough time for their family / personal life, only one in five doctors felt this was the case (22.2%) while three in five (59.7%) disagreed with the assertion. A one way ANOVA revealed significant differences between the groups with consultants indicating significantly higher work-life balance (28.3%) compared with HSTs (13.9%) and BSTs (16.5%)(F (2, 1739)=32.6, p <.001) (Table 1).

Desire to Practise

When asked to rate their desire to practise medicine, 70.6% of doctors described it as strong or very strong. Consultants were more likely to rate their desire to practise positively (73%) than both HSTs (71.4%) and BSTs (63.4%). The difference was significant between consultants and BSTs (F(2,1737) = 9.17, p <.001).(Table 1)

Work stress (ERI)

The mean score for effort (ERI) for the whole group was 9.9 (SD=2.0), with significant differences between grades (F=21.98, p< .001), and scores highest for consultants and lowest for BSTs (Table 2).

The mean score for reward for the group was 17.4 (SD=3.9), with significant differences between grades (F=30.9, p<.001) and highest scores for consultants and lowest for HSTs (Table 2).

The mean score for overcommitment for the group was 15.7 (SD=3.5) and there was no difference between the grades on this measure (F=2.87, p=.57). (Table 2)

The effort of work was not balanced by the rewards of work as evidenced by an effort reward ratio in the overall sample of 1.4 (SD=.6). A one way ANOVA revealed significant differences between the grades (F (2,1597)=9.07, p<.001), with effort reward imbalance being higher for HSTs than for BSTs or consultants. (Table 2). Effort reward imbalance (occupational stress) was evident in 81.9% of respondents (Table 2).

Burnout

Over half of the respondents had high emotional exhaustion (52.3%) and this was more prevalent in BSTs (61%) and less prevalent in consultants (45.7%) (χ^2=49.07, p<.001). The ANOVA confirmed significant differences in mean emotional exhaustion score between the grades (F (2, 1676)=19.59, p<.001). (Table 2)

High depersonalisation was reported in 28.6% of the sample, and this was more prevalent in BSTs (43.3%) and less prevalent in consultants (18.3%) (χ^2=128.07, p<.001). The ANOVA confirmed significant differences in depersonalisation score between the grades (F (2, 1680)=73.57, p<.001). (Table 2)

Low personal accomplishment was reported in 34% of the sample. A higher proportion of consultants expressed low levels of personal accomplishment (40.4%) than HSTs (28.6%) or BSTs (24.7%) (χ^2=44.16, p<.001). The ANOVA confirmed significant differences in personal accomplishment score between the grades (F (2, 1629)=24.03, p<.001). (Table 2)

Using the aforementioned EE+ 1 rule, the overall level of burnout in this population was 31% with significant between-grade differences highlighting a lower prevalence of burnout in consultants (24.4%) than in HSTs (38.1%) and BSTs (38.4%) (χ^2=38.59, p<.001). (Table2)

Factors associated with burnout

Bivariate correlation showed weak to medium correlation between independent variables. When analysing factors associated with criteria for burnout, male sex, lower desire to practise, lower work-ability, higher presenteeism, higher ERI ratio and greater overcommitment were significantly associated with burnout. For consultants, male sex, lower work-ability, higher ERI ratio and overcommitment were significantly associated with burnout, while for HSTs, male sex, lower work-life balance, higher presenteeism and overcommitment were significantly associated with burnout. For BSTs, male sex, higher ERI ratio and overcommitment were significantly associated with burnout. (Table 3)

DISCUSSION

This national survey of hospital doctors working within a single healthcare system set out to measure levels of workplace wellbeing across grades by assessing occupational stress, burnout, presenteeism, work-life balance, work ability and desire to practise in a group already shown to have high levels of psychological distress (31).

Occupational stress was reported by four out of five respondents (82%), indicating that the perceived rewards for the group and especially for the HSTs fall well short of the effort exerted. Whilst consultants reported highest levels of effort, rewards were also highest for this group. At the time of the survey, the majority of the consultants were employed on a contract which had been in existence since 1998, with a new, less favourable, contract introduced for new recruits in 2012(43), two years before this study. It remains to be seen whether these changes affect the perceived reward in the group, as the contract did not just have an impact on pay, but also curtailed the rights to engage in private practice, thus affecting autonomy(17). To date there are few studies reported on doctors that have used the ERI, so there is little opportunity for comparison. Thus the present study is a novel contribution to the literature. However, one German study of surgeons found that 25.1% of respondents reported occupational stress, a stark contrast to the 81.9%% in this study(41).

The levels of burnout in our population, utilising the conservative methodology described above for its calculation, were also high, evident in nearly a third of respondents and particularly high in trainees. With the limitations in comparability with studies of burnout elsewhere, comparison of levels of emotional exhaustion may be more meaningful. Over 50% of our population had high levels of emotional exhaustion, which is higher than in hospital doctors from the United Kingdom, the United States (US) and Australia (23-28). In our sample, burnout (EE+1) was significantly associated with male sex, lower desire to practise, lower work ability, higher presenteeism, higher ERI ratio and overcommitment, but not with years of experience or workload. In spite of the high prevalence of burnout and work stress, over two thirds of doctors expressed desire to continue in their medical career. However, the desire to practise was rated lower than that reported in British doctors where 81% reported a strong or very strong desire to practise medicine(32).

In our sample, trainees reported working significantly more hours than their consultant colleagues which may help to explain the higher prevalence of both occupational stress and burnout in trainees, in line with the literature(31). However, this was not confirmed in the binary analysis in our study. While there is no firm evidence that long hours correlate with poor mental health(44), work hours were previously found to be associated with poor personal wellbeing in this population(31) suggesting further exploration of the impact of long hours on personal wellbeing and occupational stress is needed.

It is however possible that high workload contributed to reduced work ability, which is associated with reduced job performance(45), increased risk of long term sick leave and early retirement(46). The prevalence of insufficient work ability in our sample was seven times greater (29%) than in a Dutch study where only 4% of doctors rated their work ability as insufficient(34). While caution is advised in comparing our results with that much smaller study (n = 423), our findings suggest that the working conditions of hospital doctors in Ireland are less favourable than in the Netherlands.

Presenteeism was prevalent in over 75% of all doctors and was significantly associated with burnout, in line with a comparable Norwegian study which reported 80% prevalence of presenteeism(47). A somewhat lower prevalence of presenteeism was reported in a study of US residents with senior residents reporting 62% and junior residents 52% prevalence(33). The high levels of presenteeism are perhaps not surprising in an occupational group who, uniquely, in Ireland, are imbued with the responsibility to secure 'cover' for absence, even in the context of acute illness. Indeed, the US study suggests that some of the reasons for presenteeism include misplaced dedication, reluctance to let down the team and resource issues such as lack of adequate cover due to staff shortages, all of which are evident in Irish healthcare.

This is perhaps further reflected in the poor work-life balance in our sample, with only one in five (22%) having enough time for family/ personal life. Even consultants' 28% prevalence of work-life balance, which was significantly higher than trainees', compares unfavourably with a concurrent US study in which 41%-48.5% of doctors reported satisfactory work-life balance(26,27, 48). While the aim of this study was to provide an overview of workplace wellbeing of doctors in Ireland, a further analysis of the individual factors and their interplay is needed.

There has been a recent shift in the focus of research away from simply measuring burnout prevalence to determining what interventions may be effective. It is clear from recent research that while interventions focussing on the doctor as individual can be helpful, those interventions which are focussed on the organisation are much more effective(49,50). Indeed, the findings of this study seem to indicate the need critically to review the working conditions of hospital doctors in Ireland. Surprisingly, in a milieu where evidence is the key driver of patient treatment, the evidence on the relationship between workplace psychosocial environment and employee health is paid little attention by those who fund and manage healthcare organisations. It is buried under the constant refrain of 'putting the patient first' with little regard for those who are instrumental in providing care.

Strengths and Limitations

As previously reported(31), this study is the first national survey conducted on a cohort of hospital doctors working within the same health system in Republic of Ireland. The results can be taken as largely representative as all but one hospital specialty (radiology) are included. The 55% response rate would be considered high in this population where response rates tend to be low and are declining(51). Those working in emergency medicine are over-represented (response rate 63%) which may reflect their high levels of stress and consequent willingness to participate in order to have their voice heard. Moreover, response rates tend to be lower when questionnaires are long and deal with sensitive topics(52).

The use of single items for measuring presenteeism, work-life balance, work ability and desire to practise also allows for comparison with international studies albeit the number of studies utilising these instruments in doctors is small. The use of the ERI, which posits that work effort is spent as part of a social contract, reciprocated by obtaining adequate reward, with imbalance between high effort and low reward indicating adverse work conditions, (which in some people can be exacerbated by overcommitment) make it particularly

appropriate to measuring occupational stress in the healthcare sector(53). The use of the MBI allows for comparison of burnout with previous studies of the profession.

The observation of highly significant differences between consultants and trainees across almost all measures is a novel aspect of this study and will be helpful in guiding employers and post-graduate training bodies towards possible areas for future intervention.

We note that with the numerous measures used the respondent burden may have affected response rate. It may also be that with several measures used some of the findings reported are spurious, due not only to the fact that the study was not initially powered for the outcomes reported in this paper, but also as we have conducted multiple statistical tests. We are also aware of the recent publications citing higher prevalence of distress and burnout and that the use of multiple measures poses a challenge for estimation of power calculations for each one of them. However considering the response rate of 55% and the +/- 5% margin of error for each outcome, we believe our findings are representative of the population.

On the other hand, all of the instruments we used solicited self- reports, a methodology which generates subjective views which may be subject to recall bias. The cross-sectional design of the study prevents us from determining the causality or directions of the observed associations. In our sample, the percentage of respondents holding Irish nationality was higher than the number of Irish graduates working in hospitals in a contemporaneous report. This may well reflect the fact that Irish nationals are more likely than their non-Irish colleagues to secure competitive consultant and training posts as we did not survey those in non- training service posts or locums (31). Arguably, were these groups to be included, the prevalence of all negative workplace wellbeing measures might well be higher, as they deal with the same demands as their colleagues but with even less support. Nor did we survey interns, the most junior of trainee doctors in the Irish healthcare system, who have been shown to have high levels of emotional exhaustion(54).

Implications

These negative indicators of workplace wellbeing in hospital doctors, while a cause for concern, are perhaps unsurprising considering the timing of this study, which followed several years of cutbacks in the Irish public sector. The reported prevalence of occupational stress and burnout are likely to have contributed already to the wave of emigration amongst highly trained young doctors.

For those who have stayed at home these findings serve as a reminder that medicine, always a challenging profession, is currently in distress. If the status quo is maintained, one in three doctors is likely to experience burnout and four out of five may experience occupational stress. If nearly a third continue to experience insufficient work ability, then many of those who do remain may well retire early or worse, develop health problems, forcing them to leave service prematurely. This would represent a significant loss for the Irish State, not only in fiscal terms, when considering the high cost of medical training. More importantly, it likely contributes to intolerable vacancy rates at consultant level and creates increasing pressure within the system and on their multidisciplinary team colleagues with whom they provide care. Given their association with burnout in our population, it may be worth tracking these simple measures in order to identify target areas for future intervention.

Improving the quality of patient care and reducing the frequency of adverse events are justifiably garnering the attention of researchers and funders but a growing body of evidence is linking these to physician burnout. As a society, we must ask ourselves what kind of doctors we want to care for us and whether it's acceptable to continue to expect them to perform well within a system which demands so much but provides so little

support. Bringing the focus to evidence-based interventions to improve working conditions will not only enhance the wellbeing of doctors but will likely have the added benefit of improving patient outcomes. It must be addressed urgently if we are serious about improving the quality of patient care.

Conclusion

Hospital doctors in Ireland have higher levels of burnout measures than their international peers. Across all grades, burnout was associated with male sex as was high level of overcommitment. Occupational stress, work ability, presenteeism, work-life balance and desire to practise were variably associated with burnout across grades. Levels of occupational stress were high with effort outweighing reward. One third had insufficient work ability and their work-life balance was unfavourable when compared with doctors in the US, as were levels of presenteeism. Further research is needed on the degree of interplay between individual factors and workplace wellbeing. Levels of burnout and other measures of workplace wellbeing should be monitored as a quality indicator in healthcare with a view to determining whether specific interventions have had a positive impact on their prevalence. Such evidence should inform work-force planning and retention policies to address current service gaps and improve the working lives of all those who provide clinical care.

Table 1: Sociodemographic, work and workplace wellbeing (single item) data compared by grade using one-way ANOVA.

	Consultants		HST		BST		Total		(F)p
	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	
Sex									
Male	574	60.4%	178	21%	130	34.7%	882	50.4%	
Female	375	39.5%	245	57.8%	244	65.1%	864	49.4%	
Age									
30 and under			82	19.3%	267	71.2%	349	20%	
31-40	114	12%	318	75%	97	25.9%	529	30.2%	
41-50	440	46.3%	20	4.7%	9	2.4%	469	26.8%	
51 and over	389	40.9%	2	.5%			391	22.4%	
Work load									
Mean	*54.17*	*15.09*	*61.08*	*15.47*	*59.63*	*13.02*	*57*	*7.74*	*F=38.4****
Years of practice									
Mean	*12.11*	*7.26*	*3.31*	*1.96*	*1.69*	*.86*	*15.08*	*7.26*	*F=665.27****
Work Ability Score									
Insufficient	267	28.1%	126	29.7%	118	31.5%	511	29.2%	
Sufficient	683	71.9%	298	70.3%	257	68.5%	1238	70.8%	
Mean	*6.5*	*2.1*	*6.4*	*2.1*	*6.4*	*2.0*	*6.5*	*2.0*	*F=0.44^{NS}*
Presenteeism									
Strongly agree	342	36.2%	200	47.4%	151	40.6%	693	39.8%	
Agree	373	39.4%	141	33.4%	150	40.3%	664	38.2%	
Neutral	70	7.4%	24	5.7%	23	6.2%	117	6.7%	
Disagree	118	12.5%	44	10.4%	37	9.9%	199	11.4%	
Strongly disagree	43	4.5%	13	3.1%	11	3%	67	3.9%	
Mean	*2.1*	*1.16*	*1.88*	*1.10*	*1.94*	*1.06*	*2.01*	*1.13*	*F=6.22***
Work- life balance									
Strongly disagree	147	15.6%	122	28.8%	78	20.9%	347	19.8%	
Disagree	353	37.4%	180	42.5%	164	43.9%	697	39.9%	
Neutral	177	18.8%	63	14.9%	70	18.7%	310	17.7%	
Agree	237	25.1%	54	12.7%	57	15.2%	348	19.9%	
Strongly agree	30	3.2%	5	1.2%	5	1.3%	40	2.3%	
Mean	*2.63*	*1.11*	*2.15*	*1.02*	*2.32*	*1.01*	*2.45*	*1.09*	*F=32.49****
Desire to practise medicine									
Very strong	260	27.4%	101	23.8%	78	20.8%	439	25.2%	
Strong	430	45.3%	201	47.4%	158	42.1%	789	45.3%	
Lukewarm	197	20.7%	89	21%	98	26.1%	384	22.1%	
Weak	41	4.3%	14	3.3%	14	3.7%	69	4%	
Regret	17	1.8%	18	4.2%	24	6.4%	59	3.4%	
Mean	*2.07*	*.9*	*2.17*	*.97*	*2.32*	*1.05*	*2.15*	*.96*	*F=9.17****

****=p ≤ .01 ***=p ≤ .001**

Table 2: Workplace wellbeing scales (ERI, MBI) compared by grade using one-way ANOVA/ Pearson's Chi square.

	Consultants		Higher Specialist Trainees		Basic Specialist Trainees		Total		χ^2(F) p
	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	N/ *AM*	%/ *SD*	
Effort Reward Imbalance (ERI)									
Effort mean	*10.1*	*2.0*	*9.8*	*1.9*	*9.3*	*1.9*	*9.9*	*2.0*	21.98***
Reward mean	*18.0*	*3.7*	*16.3*	*3.9*	*17.0*	*3.8*	*17.4*	*3.9*	30.87***
Overcommitment mean	*15.8*	*3.8*	*16.2*	*3.5*	*15.7*	*3.5*	*15.7*	*3.5*	2.87^{NS}
ERI ratio	*1.4*	*0.5*	*1.5*	*0.6*	*1.4*	*0.5*	*1.4*	*0.6*	F=9.07***
High work stress	*787*	*82.8%*	*355*	*83.7%*	*288*	*76.7%*	*1430*	*81.8%*	7.76*
Maslach Burnout Inventory (MBI)									
Emotional Exhaustion (EE)									
Low	212	23.5%	52	12.6%	40	11.0%	304	18.1%	
Moderate	278	30.8%	117	28.3%	102	28.0%	497	29.6%	
High	412	45.7%	244	59.1%	222	61.0%	878	52.3%	49.1***
Mean	*25.5*	*11.7*	*28.5*	*10.3*	*29.3*	*10.2*	*27.1*	*11.0*	*19.6****
Depersonalisation (DP)									
Low	479	53.0%	145	34.9%	95	26.0%	719	42.7%	
Moderate	259	28.7%	111	26.7%	112	30.7%	482	28.6%	
High	165	18.3%	159	38.3%	158	43.3%	482	28.6%	128.1***
Mean	*7.4*	*5.7*	*10.6*	*7.0*	*11.6*	*6.7*	*9.1*	*6.5*	*73.6****
Personal Accomplishment (PA)									
Low	351	40.4%	114	28.6%	90	24.7%	555	34%	44.2***
Moderate	303	34.9%	141	35.4%	135	37%	579	35.5%	
High	215	24.7%	143	35.9%	140	38.4%	498	30.5%	
Mean	*36.1*	*7.1*	*33.9*	*7.7*	*33.3*	*7.0*	*34.9*	*7.3*	*24.03****
Burnout (EE+1)									
	232	24.4%	161	38.1%	144	38.4%	537	30.8%	38.59***

***=p ≤ .001 ^{NS}=not significant

Table 3 Factors associated with burnout (Binary logistic regression).

	All		Consultants		HST		BST	
	Wald	***Exp(B) (95% C.I.)***	**Wald**	***Exp(B) (95% C.I.)***	**Wald**	***Exp(B) (95% C.I.)***	**Wald**	***Exp(B) (95% C.I.)***
Sex Male	22.07***	*1.90 (1.46-2.49)*	9.19**	*1.86 (1.24-2.77)*	6.11**	*1.96 (1.15-3.27)*	6.32**	*2.02 (1.17-3.51)*
Age Group (Ref.Cat:31-40 years)	22.61***		0.15ns		5.29ns		8.71**	
30 and under	15.29***	*1.98 (1.41-2.78)*			2.7ns	*1.91 (0.9-3.25)*	8.71**	*2.64 (1.39-5.03)*
41-50	2.33ns	*0.73 (0.49-1.09)*	0.15ns	*0.88 (0.48-1.64)*	2.4ns	*0.32 (0.08-1.35)*	0ns	
51 and over	0.51ns	*0.78 (0.4-1.53)*	0.08ns	*0.89 (0.38-2.08)*				
Years of practice	0.93ns	*0.98 (0.94-1.02)*	0.72ns	*1.02 (0.98-1.06)*	0.61ns	*0.95 (0.83-1.08)*	1.71ns	*0.8 (0.57-1.12)*
Work load	2.53ns	*1.01 (0.98-1)*	1.51ns	*1.01 (1-1.02)*	0ns	*1 (0.98-1.75)*	0.83ns	*1.01 (0.99-1.03)*
Desire to practise	5.13*	*1.18 (1.02-1.35)*	2.04ns	*1.17 (0.95-1.44)*	3.38ns	*1.31 (0.98-1.02)*	1.03ns	*1.15 (0.88-1.49)*
Work- life balance	2.12ns	*0.9 (0.78-1.04)*	0.47ns	*0.93 (0.76-1.14)*	3.72*	*0.74 (0.54-1.01)*	0.07ns	*1.04 (0.77-1.41)*
Work-ability	10.13***	*0.89 (0.83-0.96)*	6.97**	*0.88 (0.8-0.97)*	1.62ns	*0.91 (0.79-1.05)*	1.8ns	*0.9 (0.78-1.05)*
Presenteeism	6.14*	*0.85 (0.74-0.97)*	0.71ns	*0.92 (0.77-1.11)*	8.98**	*0.66 (0.51-0.87)*	0.48ns	*0.91 (0.7-1.19)*
ERI-Ratio (ERI)	11.05***	*1.57 (1.2-2.04)*	4.43*	*1.55 (1.03-2.33)*	0.88ns	*1.25 (0.79-1.98)*	6.88**	*2.15 (1.21-3.81)*
Overcommitment (ERI)	60***	*1.19 (1.14-1.24)*	32.33***	*1.2 (1.13-1.28)*	16.78***	*1.2 (1.1-1.32)*	9.6**	*1.15 (1.05-1.26)*
Constant	36.71***	*0.02*	21.61***	*0.01*	4.03*	*0.06*	9.86**	*0.01*
Nagelkerke R Square		**29.1%**		**25.9%**		**32.4%**		**30.6%**

ERI – The Effort Reward Imbalance Questionnaire; MBI – Maslach Burnout Inventory; ns – not significant *p≤0.05; **p≤0.01; ***p≤0.001

References

1. Working for a Healthier Tomorrow London: 2008.
2. Taylor, Matthew, Greg Marsh, Diane Nicol, and Paul Broadbent. Good Work: The Taylor Review of Modern Working Practices . London: Great Britain, Department for Business, Energy & Industrial Strategy, 2017. Electronic.
3. Karasek RA, Jr. Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. Administrative Science Quarterly. 1979;24(2):285-308.
4. Theorell T, Karasek RA. Current issues relating to psychosocial job strain and cardiovascular disease research. Journal of Occupational Health Psychology. 1996;1(1):9-26.
5. Bonde JP. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. Occup Environ Med. 2008;65(7):438-45.
6. Stansfeld S, Candy B. Psychosocial work environment and mental health—a meta-analytic review. Scandinavian Journal of Work, Environment & Health. 2006;32(6):443-62.
7. Nieuwenhuijsen K, Bruinvels D, Frings-Dresen M. Psychosocial work environment and stress-related disorders, a systematic review. Occupational Medicine. 2010;60(4):277-86.
8. Stansfeld SA, Fuhrer R, Shipley MJ, Marmot MG. Work characteristics predict psychiatric disorder: Prospective results from the Whitehall II Study. Occup Environ Med. 1999;56.
9. Rugulies R, Aust B, Madsen IEH. Effort–reward imbalance at work and risk of depressive disorders. A systematic review and meta-analysis of prospective cohort studies. Scand J Work Environ Health. 2017;43(4):294–306. doi:10.5271/sjweh.3632
10. Thomas S, Burke S, Barry S. The Irish health-care system and austerity: sharing the pain. Lancet. 2014;383(9928):1545-6.
11. Hourihane AM. Losing patience with an unhealthy system. Irish Times. 2013 April 27th
12. Rafter. The Irish National Adverse events study (INAES): the frequency and nature of adverse events in Irish hospitals - a retrospective record review study. bmj quality and safety. 2015.
13. West MB, Carol S; Dawson, Jeremy F; Scully, Judy; Carter, Matthew ; Anelay, Stephen; Patterson, Malcolm G; Waring, Justin. The link between the management of employees and patient mortality in acute hospitals. International Journal of Human Resource Management. 2002;13(8):1299-310.
14. The Stationery Office. THE LOURDES HOSPITAL INQUIRY:An Inquiry into peripartum hysterectomy at Our Lady of Lourdes Hospital, Drogheda. Dublin: 2006 https://health.gov.ie/wp-content/uploads/2014/05/lourdes.pdf
15. Health Service Executive. Investigation of Incident 50278 from time of patient's self referral to hospital on the 21st of October 2012 to the patient's death on the 28th of October, 2012. June 2013 https://archive.org/details/713210-hse-report-into-death-of-savita-halappanavar
16. Humphries N MS, Matthews A, Brugha R. Emigration is a matter of self-preservation. The working conditions . . . are killing us slowly': qualitative insights into health professional emigration from Ireland. Human resources for health. 2015;13.
17. Hayes B, Fitzgerald D, Doherty S, et al. Quality care, public perception and quick-fix service management: a Delphi study on stressors of hospital doctors in Ireland. *BMJ Open* 2015;5:e009564. doi: 10.1136/bmjopen-2015-009564
18. Cullen P. Brain drain warning over work conditions for consultants. Irish Times. 12/10/2013.
19. Amoafo E, Hanbali N, Patel A, Singh P. What are the significant factors associated with burnout in doctors? Occup Med (Lond). 2015;65(2):117-21.
20. Bianchi R, Schonfeld IS, Laurent E. Is it Time to Consider the "Burnout Syndrome" A Distinct Illness? Front Public Health. 2015;3:158.
21. Maslach C, Leiter, M.P. and Schaufeli, W.B. Measuring burnout, in Cooper, C.L. and Cartwright, S. (Eds), The Oxford Handbook of Organizational Wellbeing, Oxford University Press, Oxford, pp. 86-108.: Oxford University Press; 2008.
22. Rotenstein LS, Torre M, Ramos MA, Rosales RC, Guille C, Sen S, Mata DA. Prevalence of burnout among physicians, a systematic review. JAMA. 2018;320(11):1131-1150
23. Prins JT, Gazendam-Donofrio SM, Tubben BJ, van der Heijden FM, van de Wiel HB, Hoekstra-Weebers JE. Burnout in medical residents: a review. Med Educ. 2007;41(8):788-800.
24. Sharma A, Sharp DM, Walker LG, Monson JR. Stress and burnout in colorectal and vascular surgical consultants working in the UK National Health Service. Psychooncology. 2008;17(6):570-6.

25. Shanafelt TD, Balch CM, Bechamps GJ, Russell T, Dyrbye L, Satele D, et al. Burnout and career satisfaction among American surgeons. Ann Surg. 2009;250(3):463-71.
26. Shanafelt TD, Boone S, Tan L, Dyrbye LN, Sotile W, Satele D, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. Arch Intern Med. 2012;172(18):1377-85.
27. Shanafelt, T. D., Hasan, O., Dyrbye, L. N., Sinsky, C., Satele, D., Sloan, J., & West, C. P. (2015). Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014. Mayo Clinic Proceedings, 90(12), 1600–1613. doi:10.1016/j.mayocp.2015.08.023
28. National mental health survey of doctors and medical students. Australia: 2013.
29. Tait D. Shanafelt CMB, Gerald Bechamps, Tom Russell,, Lotte Dyrbye DS, Paul Collicott,Paul J. Novotny, Jeff Sloan,, and Julie Freischlag. Burnout and Medical Errors Among American Surgeons. Archives of Internal Medicine. 2010;172(18):1377-85.
30. Carolyn S Dewa DL, Sarah Bonato, Lucy Trojanowski. The relationship between physician burnout and quality of healthcare in terms of safety and acceptability: a systematic review. BMJ Open. 2017;7(6).
31. Hayes B, Prihodova L, Walsh G, et al. What's up doc? A national cross-sectional study of psychological wellbeing of hospital doctors in Ireland. *BMJ Open* 2017;7:e018023. doi: 10.1136/bmjopen-2017-018023
32. Cohort study of 2006 medical graduates. Tenth report. September 2016.
33. Jena AB, Baldwin BC, Daugherty SR et al. Presenteeism among resident physicians (letter). JAMA 2010;304(11):1166-68.
34. Ruitenburg MM, Frings-Dresen MH, Sluiter JK. The prevalence of common mental disorders among hospital physicians and their association with self-reported work ability: a cross-sectional study. BMC Health Serv Res. 2012;12:292-8.
35. Creating Balance? International Perspectives on the Work-Life Integration of Professionals. Kaiser S, Ringlstetter MJ, Eikhof DR, Pina e Cunha M, editors.
36. Work Ability Index (2nd Edition). Helsinki: Finnish Institue of Occupational Health, 1998 Contract No.: 2nd Edition.
37. Ilmarinen J. The Work Ability Index (WAI) Occupational Medicine. 2007;57(2).
38. Ilmarinen J. Work ability--a comprehensive concept for occupational health research and prevention. Scand J Work Environ Health. 2009;35(1):1-5.
39. Psychometric properties of the effort-reward imbalance questionnaire. Siegrist J, Li J, Montano D. June 4th 2014.
40. van Vegchel N, de Jonge J, Bosma H, Schaufeli W. Reviewing the effort-reward imbalance model: drawing up the balance of 45 empirical studies. Soc Sci Med. 2005;60(5):1117-31.
41. Von dem Knesebeck O, Klein J, Grosse Frie K, Blum K, Siegrist J. Psychosocial stress among hospital doctors in surgical fields: results of a nationwide survey in Germany. Dtsch Arztebl Int. 2010;107(14):248-53.
42 Brenninkmeijer V, VanYperen N. How to conduct research on burnout: advantages and disadvantages of a unidimensional approach in burnout research. Occupational and Environmental Medicine. 2003;60(Suppl 1):i16-i20.
43. Bohan C. James Reilly: new consultants will have to face a hefty pay cut. The journal. 17/9/2012.
44. Maria Cruz Rodriguez-Jareño, Evangelia Demou, Sergio Vargas-Prada, et al. European Working Time Directive and doctors' health: a systematic review of the available epidemiological evidence. *BMJ Open* 2014;4:e004916. doi: 10.1136/bmjopen-2014-004916.
45. Alavinia SM, van den Berg TIJ, van Duivenbooden C et al. Impact of work-related factors, lifestyle, and work ability on sickness absence among Dutch construction workers. Scand J Work Environ Health 2009;35(5):325-33.
46. Sell L, Bültmann U, Rugulies R, et al. Predicting long-term sickness absence and early retirement pension from self-reported work ability. Int Arch Occup Environ Health 2009 Oct;82(9):1133-8. 2009;82(9):1133-8.
47. Rosvold EO, Bjertness E. Physicians who do not take sick leave: hazardous heroes? Scand J Public Health. 2001;29(1):71-5.
48. Shanafelt TD, Hasan O, Dyrbye LN, Sinsky C, Satele D, Sloan J, et al. Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014. Mayo Clin Proc. 2015;90(12):1600-13.
49. Colin P West, Liselotte N Dyrbye, Patricia J Erwin, Shanafelt TD. Interventions to prevent and reduce physician burnout:a systematic review and meta-analysis. The Lancet , Volume 388 , Issue 10057 , 2272 - 2281
50. Panagioti M, Panagopoulou E, Bower P, et al. Controlled Interventions to Reduce Burnout in Physicians: A Systematic Review and Meta-analysis. JAMA Intern Med. 2017;177(2):195-295.

51. Thorpe C, Ryan B, McLean SL, Burt A, Stewart M, Brown JB, et al. How to obtain excellent response rates when surveying physicians. Fam Pract. 2009;26(1):65-8.
52. Edwards PJ, Roberts I, Clarke MJ, et al. Methods to increase response to postal and electronic questionnaires. Cochrane database of systematic reviews. 2009;3:MR000008.
53. Effort-reward imbalance at work -theory, measurement and evidence. Dusseldorf, Germany: University of Medical Sociology, 2012.
54. Hannan E et al. Burnout and stress amongst interns in Irish hospitals: contributing factors and potential solutions. Ir J Med Sci 2017;187(2):301-7.

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Data statement

As per the ethics approval, the data will not be shared outside of the participating research institutions. Any sharing of the data beyond the group will be subject to review by the host institution (Royal College of Physicians of Ireland) and to independent research ethics application. Any queries on how to access the dataset should be directed to research@rcpi.ie.

Contributors

All authors met at least one of the criteria recommended by the ICMJE and have agreed on the final version of the manuscript. BH and GW were involved in conceiving and designing the original protocol. BH wrote the first draft of the manuscript. LP, SD, GW and FD contributed to subsequent drafts and FD provided statistical advice.

Conflicts of interest

None

Ethics approval

Research Ethics Committee Royal College of Physicians of Ireland December 2013 (RCPI RECSAF 20).

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation		Page
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Yes	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Yes	2
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Yes	3
Objectives	3	State specific objectives, including any prespecified hypotheses	Yes	3
Methods				
Study design	4	Present key elements of study design early in the paper	Yes	3
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Yes	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Yes (this paper refers to previous paper already published in BMJ Open [ref 31) which sets out greater detail of methodology	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Yes	4-5
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	Yes	4-5
Bias	9	Describe any efforts to address potential sources of bias	Yes	2,4,9
Study size	10	Explain how the study size was arrived at	Yes (see item 6)	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Yes	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Yes	5,6,7

		(*b*) Describe any methods used to examine subgroups and interactions	Yes	6,7
		(*c*) Explain how missing data were addressed	See supp file 4	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A	
		(*e*) Describe any sensitivity analyses	N/A	
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	Yes, see ref 31 (prev paper)	4, 5,6
		(b) Give reasons for non-participation at each stage	N/A	
		(c) Consider use of a flow diagram	Supp file 5	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Yes Table 1	6,7,8 11
		(b) Indicate number of participants with missing data for each variable of interest	Yes (see 12c)	
Outcome data	15*	Report numbers of outcome events or summary measures	Yes Table 1,2	5,6 11,12
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	Yes	5,6
		(*b*) Report category boundaries when continuous variables were categorized	Yes	4,5
		(*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	N/A	
Discussion				
Key results	18	Summarise key results with reference to study objectives	Yes	7-8
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	Yes	8-9
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Yes	9
Generalisability	21	Discuss the generalisability (external validity) of the study results	Yes	9

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	Yes	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 www.strobe-statement.org.