

**Full title: Need for recovery and physician well-being in emergency**

**departments: national survey findings**

Short title: Emergency medicine well-being and recovery

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## ABSTRACT

### Background and importance

Need for recovery (NFR) describes an individual's need to physically and psychologically recuperate following a period of work. Physicians working in emergency departments (EDs) have higher NFR scores than other occupational groups. Increased NFR may precede occupational burnout and identification provides opportunities for early interventions.

### Objective

To identify the incidence of well-being characteristics for ED physicians and to determine if NFR score is associated with these characteristics, whilst adjusting for potential confounders.

### Design

This is a secondary analysis of a survey study. Responses to 11-items were summated into the NFR score, from 0 (lowest NFR) to 100. Additional items (n=44) explored well-being, demographic and occupational characteristics.

### Setting and Participants

Physicians working within 112 EDs in the UK and Ireland were surveyed in June-July 2019.

## **Outcome measure and analysis**

The outcome measure was self-perceptions of well-being including; current burnout, risk of future burnout and feeling overwhelmed at work. Descriptive statistics are presented alongside findings of a multiple regression analysis.

## **Main results**

In 4365 participants, the self-percieved incidence of current burnout, high-risk of future burnout and feeling overwhelmed at work more than once a week was 24.8%, 62.7%, and 45.1%, respectively. For every unfavourable response of the NFR scale there was an increase in odds of 34.0% (95% CI: 31.0 to 37.1) for frequency of feeling overwhelmed; 53.8% (95% CI: 47.5 to 60.4) for current burnout; 56.2% (95% CI: 51.1 to 61.6) for high-risk of future burnout.

## **Conclusion**

This study confirms an association between increased NFR score and self-perceived well-being characteristics. Factors previously reported to reduce NFR could therefore be important initiatives to improve well-being of the ED workforce.

**Keywords:** Emergency Medicine; Physicians; Fatigue; Occupational Health; Need for Recovery; Well-being; Burnout

## 1 Introduction

2 Occupational burnout results from chronic workplace stress, and is typically  
3 categorised by the identification of emotional exhaustion, depersonalisation and  
4 reduced personal efficacy.[1] Burnout is now recognised as an occupational  
5 phenomenon in the International Classification of Diseases 11<sup>th</sup> Edition and represents  
6 a significant problem for the healthcare workforce.[2] The financial burden of physician  
7 burnout in the US alone is estimated at \$4.6billion, whilst mental health conditions and  
8 work stress form the predominant reasons for physician referral to occupational health  
9 services in the UK National Health Service (NHS).[3,4]

10  
11 Those working in emergency departments (ED) may be at higher risk of developing  
12 occupational burnout.[5] Reasons for this may include psychological demands of work,  
13 poor availability of resources, and perceived lack of support, in addition to the inherent  
14 difficulties of high-intensity shiftwork and its impact on work-life balance.[6,7] Whilst  
15 burnout is expensive for employers, it also leads to distress and morbidity for individual  
16 sufferers with increased risk of motor vehicle accidents, sleep disturbances and  
17 substance abuse reported.[8] Adverse patient care outcomes related to physician  
18 burnout include reduced care quality and satisfaction, increased medical error risk,  
19 and impacted productivity and ED patient waiting times.[9–11] On a system-wide level,  
20 occupational burnout may exacerbate recruitment challenges and contribute to  
21 workforce attrition in emergency care settings.[12]

22  
23 Burnout inventories aim to measure the incidence of occupational burnout, and have  
24 been widely applied within national physician training surveys and the ED  
25 setting.[13,14] There are however limitations to their use, with some recent surveys

reporting poor responses rates which could reflect participant views on utility or concerns over survey length. [15] Further more, diagnosing burnout once it has already occurred is arguably too late. Within busy emergency care workforces, a well-being tool which is easy and quick to complete and allows for early identification of impaired well-being could confer important benefit.

The Need For Recovery (NFR) scale measures the time taken to physically and psychologically recuperate from a period of work. NFR is cumulative over time, and elevated NFR has been associated with an increased risk of depression, physical and psychosomatic health complaints, and sickness absence.[16–18] NFR is measured using an 11-item scale developed as part of the Dutch Questionnaire on the Experience and Evaluation of Work (QEEW).[19] The NFR scale can be a useful tool in the identification of high-risk individuals and groups, and therefore assist with burnout prevention.

A single centre UK study assessed the acceptability of the NFR scale among an ED population, reporting a response rate of 80.3% and good utility.[20] Further work was conducted in 112 UK and Ireland EDs.[21] In contrast to previous studies reporting NFR scores ranging from 36-44 out of 100, ED physicians had a median NFR score of 70, the highest score reported in the literature to date.[16,18,21,22] Using the dataset of this study, the aim of this a priori analysis was to identify the incidence of self-percieved well-being of ED physicians and to determine if NFR scores are associated with well-being characteristics, whilst adjusting for potential confounders.

## Methods

This electronic cross-sectional survey of physicians working within UK and Ireland EDs was coordinated via the Trainee Emergency Research Network (TERN) in collaboration with Paediatric Emergency Research in the UK and Ireland (PERUKI) and Ireland TERN. Data were collected during a six-week period from 3rd June 2019, through Research Electronic Data Capture platform ('REDCap'; University of Bristol).[23] The justification for use of the NFR scale, survey development, distribution, monitoring and recruitment have been reported previously,[21] and the methods will be presented in a summarative form below. The Checklist for Reporting Results of Internet E-surveys was used to design and report the study.[24] Ethical approval was provided by the National Health Service Health Research Authority (Ref: 262048) and institutional approval was sought for participating sites. The study was registered at ISRCTN (<https://doi.org/10.1186/ISRCTN21869845>).

## Participants

Physicians of any grade registered with the UK General Medical Council or Irish Medical Council, and employed within a participating site, were eligible. The working definition of 'ED physician' for the purposes of this study included all physicians whose main clinical role was within the ED. This encompassed physicians specialising in emergency medicine (EM) and non-EM physicians undertaking rotations in the ED (including those in year one and two of postgraduate training and General Practice, Anaesthesia and Acute Medicine specialisms who commonly undertake a four to six month ED rotation). Physicians who did not hold a permanent contract with a participating hospital (such as those working ad-hoc locum shifts), those on leave during the survey period, or in a non-clinical role, were excluded.



Prior to study commencement, site principal investigators provided an estimate of eligible participants, accounting for local physician absence. This denominator was used to give a best-estimate of the per-site survey response rate, with a stated aim of achieving a 70% response rate, which over half of the sites exceeded.

### ***Survey and Outcome Measures***

The e-survey included the 11-item NFR scale plus an additional 44-items exploring demographic, occupational and well-being characteristics (online supplemental material 1).[21] A 'yes' response to an NFR item, with the exception of question four which is reversed, signals an unfavourable situation. The 11-items are then summated to give an overall score between 0 and 100, with each item contributing 9.09 to the total score. The NFR scale has good internal consistency and questionnaire reliability, with an overall Cronbach's alpha of 0.88.[19] Previous comparisons of the NFR scale to fatigue measures, and to a lesser degree stress-related health complaints, have shown correlation and indicated content validity. [25] Furthermore, assessment of the predictive value of the scale amongst healthcare workers found it was predictive for duration and frequency of sickness absence over a six month period.[25] Sluiter et al. found a significant relationship between NFR and psychosomatic complaints and with emotion exhaustion, a key component of occupational burnout, in coach drivers when controlling for other variables.[26]

The outcome measure for this investigation was self-perceived well-being. Constructs of interest to the study team in relation to participants' well-being used individual single-item questions (Fig. 1). For questions relating to burnout self-perception, a dichotomous 'yes'/'no' response was used in keeping with the responses required for

the NFR scale, whilst frequency of feeling overwhelmed was measured using a categorical rating scale (online supplemental material 1). The face validity of these items were assessed during the public and patient involvement consultation process.

## **Statistical Analysis**

Statistical analysis was undertaken using STATA 14.[27] Participants were only included if they were from one of the 112 registered sites. In cases of missing data, the NFR score was imputed by replacing missing items with the mean of all completed item responses if the number of missing items did not exceed three.[28] Outcome measures have been summarised as frequency and percentages, and due to the distribution being negatively skewed, NFR score by outcome measure category has been summarised by median and inter-quartile range (lower quartile to upper quartile).

Mixed effects, logistic regression models were fitted to the burnout questions and a mixed effects ordinal logistic regression model was fitted to overwhelmed frequency question to investigate associations with the NFR score. Any participant missing the outcome measure response was excluded from that model. All of the models were adjusted for potential confounding with previously identified associations with NFR score.[21] These included gender, study and annual leave, clinical grade, time working out of hours, long term health condition or disability, type of patients seen as fixed effects and registered sites as random effects. Models were fitted to participants with valid data for all variables included in the model.

## Results

There were 5107 unique entries to the e-survey, with 4365 participants being employed in registered sites, and therefore eligible for inclusion in the analysis. Most sites were in England (79.5%) with between 50,000 and 100,000 annual attendances a year (41.1%). The majority of study participants worked full time (83.5%), were aged between 26 and 30 years (28.6%) and 46.9% of participants were female. Full details of study participants and site characteristics can be found in Cottey et al.[21]

For each of the well-being outcome measures, there were some participants who declined to answer or no response was entered. In total, missing data for current burnout, future burnout and feeling overwhelmed was 558 (12.8%), 514 (11.8%) and 248 (5.7%), respectively. These participants were not included in further analysis.

Figure 2 demonstrates the percentage of participants for each well-being outcome measure, with box plots of NFR score. In total, 1027 (24.8%) participants reported current burnout, 2622 (62.7%) risk of future burnout and 2019 (45.1%) felt overwhelmed at least once a week. In each box plot, those who reported current or felt at high-risk of future burnout had a higher median NFR score than those who did not. As the frequency of feeling overwhelmed increased, the median NFR score also increased.

Not all participants provided complete data for all outcomes and covariates included in the regression models. Therefore, 3987 participants were included in the current burnout model, 3828 participants in the future burnout model and 4311 in the overwhelmed model.

The association between NFR score and all three outcomes are presented in table 1. Full details of the fitted models can be found in the online supplemental material tables S1 to S3. In both burnout models, an increase in NFR score by 1 increased the odds of current and high-risk of future burnout by 4.9% and 5.0%, respectively. In the frequency of feeling overwhelmed, each unit increase in NFR score increased the odds of moving into a higher category of frequency by 3%. The narrow confidence intervals of the NFR scale odds ratio indicated strong evidence of a statistically significant association,  $p < 0.001$  for all models.

As the NFR score is from 0 to 100, we examined the scale using a logit link model to estimate the change for every unfavourable response on the 11-item scale. The fitted models indicated an unfavourable response led to a; 34.0% (95% CI: 31.0 to 37.1) increase in odds of increased frequency of feeling overwhelmed; 53.8% (95% CI: 47.5 to 60.4) increase in odds of current burnout; 56.2% (95% CI: 51.1 to 61.6) increase in odds of future burnout.

## Discussion

The incidence of self-percieved current burnout in this population is lower than burnout estimates reported by other studies amongst emergency physician populations.[3,5,29] However, this figure rose sharply when participants were asked if they percieved themselves to be at high-risk of burnout in the future. This implies that participants have significant concerns regarding their personal well-being and job sustainability at the time of data collection. These findings reflect previously reported

1 national survey data highlighting workforce concerns relating to workload, work  
2 environment, and career sustainability.[14]

3  
4 Nearly half of respondents reported feeling overwhelmed at work more than once per  
5 week. The feeling of 'being overwhelmed' may represent a complex, multi-dimensional  
6 construct. Although it has not been extensively investigated amongst physicians, aside  
7 from excessive workload, factors such as high external expectations,[30] exposure to  
8 clinical complexity, and behavioural traits such as neuroticism may contribute.[5,29]  
9 The response to this question likely represents the personal impact of what is reported  
10 more broadly in EDs, with high workloads, concerns about crowding and patient care  
11 delivery frequently highlighted.[14] As with NFR itself, feeling overwhelmed does not  
12 form part of formal definitions of burnout, but may warrant further attention, as an  
13 additional novel construct to monitor and improve staff well-being.

14  
15 For healthcare staff sustainability, it is vitally important to prevent burnout occurring.  
16 Previous validity work on the NFR scale correlates the scale with fatigue,  
17 psychosomatic complaints and emotional exhaustion measures in a range of  
18 occupations.[19,22,26] Identification of the association of NFR score and self-  
19 perceived well-being in this study further highlights the use of the NFR scale as a  
20 potential tool for identifying and monitoring workforce well-being. The benefits of the  
21 NFR scale over more complex burnout inventories is its survey length and  
22 dichotomous question type. With only 11 items, an unfavourable response for one item  
23 leads to an NFR score increase of nine units, which means the percentage increase  
24 in odds for a poor well-being outcome is approximately ten times the size. Where the  
25 NFR score rises on a team or departmental level, actions and interventions should

1 then be undertaken to reduce the score. A range of significant associations to the NFR  
2 score have previously been determined, some of which may be modifiable and stand  
3 to improve staff well-being. [21]

4  
5 The results of our study demonstrate that, despite widespread recognition and effort  
6 to make improvements within the ED workforce, this may not be creating the change  
7 needed to ensure retention, personal well-being and career fulfillment. This study was  
8 not longitudinal in nature and therefore we are unable to assess what proportion of  
9 those perceiving themselves to be at high risk of future burnout will subsequently  
10 develop an occupational burnout diagnosis. However in terms of real world utility, staff  
11 feeling at high risk of burnout regardless of subsequent development rates, should be  
12 of significant concern and offer insight into the current state of healthcare workforce  
13 well-being. The use of this question to self-identify future risk at an early stage could  
14 be protective and will allow for initiation of preventative action. When viewed in the  
15 context of high rates of attrition from EM training it could be hypothesised that any  
16 initiatives which reduced those currently perceiving themselves to be at high-risk of  
17 future burnout would have important workforce implications.

## 18 19 **Limitations**

20 A weakness of our study is the single-point-of-time measurement. Seasonal bias could  
21 have influenced the burnout incidence reported, although this is in contrast to the high  
22 NFR score observed. We are also cognisant that those physicians on leave and non-  
23 clinical duties have been omitted, of particular interest would be those whose absence  
24 is related to well-being or work factors. As a result their important experiences are not

1 reflected and this could have additionally influenced the incidence of well-being  
2 outcomes.

3 Furthermore, it is possible that use of a single item question is less sensitive for the  
4 detection of burnout compared to a validated diagnostic instrument. Although this is  
5 incongruous to previous studies in healthcare staff reporting correlation of self-  
6 perceived single-item questions with the emotional exhaustion sub-scale of the  
7 Maslach Burnout Inventory and capturing similar levels of burnout to suggested  
8 professional averages.[31,32] A formal burnout inventory was omitted from our study  
9 as the primary aim was to explore NFR rather than to diagnose occupational burnout.  
10 This decision was based on feedback during the feasibility and PPI process where  
11 focus group participants actively discouraged the inclusion of a multi-item inventory,  
12 citing they were 'burned out with burnout inventories'.

13  
14 The inclusion of physicians at early postgraduate stages of training and non-EM  
15 specialists has resulted in a heterogenous study group. This may limit applicability to  
16 a specific EM population but should allow for generalisability when considering a whole  
17 organisation approach to improving ED staff well-being. The rationale for including all  
18 physician groups was to ensure capture of the short-term workforce who provide  
19 significant service provision. Additionally, these rotating physicians are a potential EM  
20 recruitment pool and understanding their experiences could be relevant for improving  
21 the desirability of EM as a career option, in a current climate of challenging recruitment  
22 and retention.

## 23 24 **Conclusion**

This study identifies a clear need for well-being interventions to reduce the rate of those ED physicians perceiving themselves to be currently burnout and at high-risk of future burnout. Self-perceived well-being is strongly correlated with elevated NFR score amongst ED physicians. The NFR scale is a tool which could be used to identify impaired well-being and prevent burnout. Factors previously reported to reduce NFR could be targeted for initiatives to improve ED workforce well-being on an individual and organisational level.

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## Illustration legend

**Figure 1:** Items to measure well-being characteristics

**Table 1:** Association of NFR and well-being outcomes.

**Figure 2:** Bar charts of self-perceived current (a) and high-risk of future (c) burnout, and the frequency of feeling overwhelmed (e). Box plots of the NFR score by self-perceived current (b) and highrisk of future (d) burnout, and frequency of feeling overwhelmed (f)