



Research article

Burnout and clinical learning environment among residents in Tehran: A cross-sectional study

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ABSTRACT

Purpose: This study aimed to evaluate the quality of the educational environment in Tehran University of Medical Sciences across different medical specialties and its correlation with residents' burnout.**Materials and methods:** This cross-sectional study was conducted at Tehran University of Medical Sciences among residents drawn from three largest teaching hospitals affiliated. The Maslach Burnout Inventory and Postgraduate Hospital Educational Environment Measure (PHEEM) questionnaire were used to collect data through web-based, as well as paper-and pencil questionnaires. The data was analyzed using SPSS.**Results:** A total of 221 residents completed the survey, with a response rate of 82%. Burnout was reported by 67.4% of medical residents. The total PHEEM score had a negative correlation with emotional exhaustion ($r = -0.57$, $P < 0.001$), depersonalization ($r = -0.40$, $P < 0.001$), and a positive one with personal accomplishment ($r = 0.42$, $P < 0.001$). Perception of social support significantly predicted burnout subscales ($P < 0.05$). PHEEM subscales also explained a small proportion of variance in emotional exhaustion ($R = 0.55$, $R^2 = 0.308$, $P < .001$). Clinical learning environment independent of personal characteristics was associated with residents' burnout according to multivariate regression analysis [OR = 0.567 (0.170–0.883), $P = 0.012$].**Conclusion:** Clinical learning environment independent of personal characteristics was associated with residents' burnout in Iran. We suggest some initiatives to be introduced ranging from improving the clinical environments, reduce workloads and provide social support to all residents as well as encouraging them to involve in other extracurricular activities like music and physical exercise.

1. Introduction

Residency curricula are designed to ensure that future specialists are well-prepared to deliver high quality care to the patients. Although medical schools hold residency programs to move students toward these goals, some components of the work and learning environment have an unintended and inevitable impact on residents' mental health [1]. Burnout, a psychological phenomenon resulting from emotional exhaustion, depersonalization and diminished sense of accomplishment

along with effectiveness that frequently occurring in health care providers related to work stress [2].

Recent studies have demonstrated that a high percentage of medical residents experience severe burnout during their postgraduate medical training [3, 4]. In a survey of Wayne State University residents, on average 50% suffered from burnout ranging from 75% in obstetrics/gynecology to 27% in family medicine [5]. A recent meta-analysis revealed burnout prevalence of 51% among 22,778 residents and confirmed specialties such as neurology, radiology and general surgery

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with the most burnt-out residents [6]. High prevalence of burnout not only reported among medical residents, but also in other health care providers such as nurses which consequently led to some suggestions on policy changes to improve healthcare quality [7].

In addition to hindering the professional development of residents, burnout may lead to job dissatisfaction, errors in patient care, and impaired job performance [8]. Studies on the causes of burnout in residency training have revealed that time constraints, lack of autonomy, workload compounded by various factors such as future career worrisome among others, are stressors that would cause burnout [9, 10, 11]. This shows that the main factors resulting in burnout within the clinical learning environment, rather than individual characteristics [1, 12].

Other recent studies showed approximately one in three medical students to have anxiety or depression worldwide which is significantly higher than the general population, while case recognition for depression diagnosis and treatment rate was low [13, 14]. Alternatively, in other study focused on Asian undergraduate medical students, depression prevalence of 11% was reported and they concluded that depression in medical schools would lead to burnout [15].

Based on the healthcare priorities, the annual capacity of residency program is nearly 4300 residents in 35 medical universities in Iran. The length of the training programs are similar with other countries and ranging from 3-5 years depending on the types of specialties which is more or less similar most residency programs worldwide though there are some differences. Comparing Iranian residents with Turkish, Canadian, American and Europeans, Iranian residents spend more weekly working hours than Turkish, Canadian and Europeans with less free time for leisure [16, 17]. For example, the duty hours of a 1st year Iranian internal medicine resident are 92 hr per week, while Canadians and Europeans are 72–84 hr per week. The residency program in Iran includes bed-side rounds and mortality or morning reports as well as lecture-based classes as routine education worldwide. Residents in other countries experience more diverse programs including night float in the American programs and junior attending on clinical teaching unit (CTC) and multidisciplinary clinical teams (MCT) in Canadians [16, 17]. Considering income, the Canadian residents receive the highest yearly income (60,000–74,000 \$), while Iranian residents receive 1500–1700 \$, one of the least globally. Such huge discrepancies have become an issue and gradually gained momentum to improve the well-being of residents and consequently impact on their work efficiency which led us to investigate the problem contextually and uncover the challenges in our residency trainings is among the significances of this study.

Like in elsewhere, we presume our residents are also affected by considerable degrees of burnout due to their responsibilities in teaching hospitals and their unsupported decision-makings [9] and this necessitated our study.

This study aimed to evaluate the quality of the educational environment in the tertiary teaching hospitals of Tehran University of Medical Sciences (TUMS) across different medical specialties and its correlation with residents' burnout.

2. Materials and methods

2.1. Research context

Medical school graduates in Iran can apply for residency after achieving adequate scores in the residency entrance exam, which is held annually by the National Center for Evaluation of Medical Education (NCEME). Residency programs for different specialties are applied uniformly for all universities and consists of a three-to-five-year training of major and collateral rotations in specialized hospital wards and divisions as well as clinics and emergency departments according to the specialty types. Residency duration for most of specialties are 4 years. For

neurosurgery and radio-oncology currently is 5 years, while for pediatrics it is 3 years.

2.2. Participants

221 medical residents with different specialties participated in this study. Participants included residents of various levels at Tehran University of Medical Sciences' residency programs, ranging from post graduate year (PGY) 1 to PGY4. All specialties were categorized into three subgroups of surgical (general surgery, neurosurgery, gynecology, emergency medicine, otolaryngology, urology and ophthalmology), medical (including internal medicine, neurology, pediatrics, radio-oncology and cardiology) and para-clinical (radiology, pathology, and nuclear medicine) [6]. We used the G*Power 3.1.9.7 software to calculate the sample size. A sample of 231 students would be enough considering $\alpha = 0.05$, $\beta = 0.2$, effect size = 0.25, among different specialties.

2.3. Procedures

The present cross-sectional study was carried out in three main teaching university-affiliated hospitals of Tehran University of Medical Sciences. We distributed questionnaires mostly in December that is far enough from exams and holidays, which could influence results of study. To assess symptoms of burnout among the participants, a Maslach Burnout Inventory (MBI) as well as the Postgraduate Hospital Educational Environment Measure (PHEEM) questionnaire were used to evaluate residents' views towards the clinical environment. To increase response rate, we used both web-based and paper-and-pencil questionnaires. Paper-and-pencil questionnaire was handed out personally to residents by a 6th year medical student and was collected after few hours. Web-based questionnaires that would expire after 48 hr following two reminders were disseminated among the students. Baseline demographic data including age, gender, and marital status, year of residency training and field of residency were collected from all participants.

2.4. Survey instrument

2.4.1. Maslach Burnout Inventory (MBI)

We used MBI tool which is a self-administered, containing 22 items [18]. Of the 22 items of MBI, 9 of them evaluates emotional exhaustion and the rest five and eight items evaluate depersonalization and personal accomplishments, respectively. Each item's response was rated from 0 to 6 (0 = never; 1 = a few times per year; 2 = once a month; 3 = a few times per month; 4 = once a week; 5 = a few times per week; and 6 = every day). In this study, we considered burnt out of residents as either having emotional exhaustion when the score ≥ 27 or depersonalization when the score ≥ 13 or personal accomplishment when the score ≥ 37 . The disaggregates for each dimensions of burnout are listed below;

- Emotional exhaustion is low when the score is < 16 , moderate 17–26, high ≥ 27 score;
- Depersonalization is low when the score is 0–6, moderate 7–12, high ≥ 13 score; and
- Personal accomplishment is low when the score is ≥ 37 , moderate 31–36, high 0–30 score. (8).

The validity and reliability of the Farsi MBI have been proved by Al Mutair et al under the license of Mindgarden Inc [18].

2.4.2. PHEEM questionnaire

The PHEEM questionnaire is a scale to evaluate perception of resident physicians about the quality of educational environment in their hospitals. It has 40 items in three defined subscales consisting of 14 items for

perceptions of role autonomy (POR) which includes level of responsibility, tasks, clinical protocols, team working, and practical procedures; 15 items perceptions of teaching (POT) which consists of teachers' expectations, supervision, communication skills, education relevancy, enthusiasm, teaching skills, accessibility, feedback, and encouragement; and 10 items for perceptions of social support (POS) which includes sex discrimination, access to career advice, accommodation quality, environment safety, and counseling opportunities. Item 7 (there is racism in this post) was not applicable as all residents are Iranians of the same racial group [19].

Scores for perceptions of role autonomy are interpreted as the following: 0–14 very poor, 15–28 a negative view of one's role, 29–42 a more positive perception of one's job, 43–56 excellent perception of one's job. Scores for perceptions of teaching are interpreted as: 0–15 very poor quality, 16–30 in need of some retraining, 31–45 moving in the right direction, 46–60 model teachers; and scores for perceptions of social support are interpreted as: 0–11 non-existent, 12–22 not a pleasant place, 23–33 more pros than cons and 34–44 a good supportive environment [20].

2.5. Ethical considerations

Anonymous questionnaires were distributed to all the residents on voluntary basis and were informed that their responses would not influence their educational or practical status in the hospital.

Patients or the public were not involved in this study. The protocol of this study was approved by Ethics Committee for research studies of Tehran University of Medical Sciences institutional review board IR.TUMS (97-02-76-32557). After written informed consent was obtained from all participants data were then collected in accordance with relevant guidelines and regulations. This study was also registered to the www.researchregistry.com (unique identifying code: researchregistry6673).

2.6. Statistical analysis

In the next phase of the research, the data was analyzed by SPSS. Kolmogorov–Smirnov test was used to determine whether the PHEEM and MBI total scores were distributed normally or not. Then the Student t test, ANOVA, Pearson correlation coefficient test and linear regression were employed to examine the relationship between PHEEM score (or subscale scores) and gender, marital status, PGY, specialty and MBI score (or subscale scores). Also, we used a multivariate regression analysis for this association by adjusting confounding factors.

This manuscript has been reported in line with the STROCSS criteria [21].

3. Results

The reliability of Persian PHEEM and MBI questionnaire were high with a Cronbach's alpha coefficient of 0.86 and 0.92, respectively.

3.1. Respondent characteristics

As shown in Figure 1, of the 270 medical residents who participated, 221 completed both MBI and PHEEM questionnaires with a response rate of 82%. Based on the data from matched pairs analyzed, the mean age was 30.9 ± 4.7 and over half (62.4%), were females and 119 were married (53.9%). Eighty-nine (40.2%) residents were in year 1, 67

(30.3%) in year 2, 44 (19.9%) in year 3, and 21 (9.5%) in year 4 (Table 1).

3.2. Burnout prevalence and clinical environment status

The mean score for perceptions of role autonomy was 39.7 ± 6.7 ; for perceptions of teaching 43.5 ± 10.7 , and for perceptions of social support 29.5 ± 4.9 . For total PHEEM score, it was 112.7 ± 20.3 . Table 2 represents results of MBI-HSS of sampled population. The proportion of residents that had high score of emotional exhaustion, depersonalization and reduced personal accomplishment was 56.1%, 57.9% and 38.9%, respectively.

3.3. Association between learning environment and burnout

We used univariate analyses to identify demographic and occupational predictors of burnout. None of the sociodemographic variables including gender ($p = 0.51$), marital status ($p = 0.81$), year of residency training ($p = 0.31$), type of specialty ($p = 0.31$), and age ($p = 0.43$) were associated with the level of burnout of the residents. After adjusting for these predictors (gender, specialty, marital status and age) of resident burnout in a multivariate regression analysis, we found an inverse and statistically significant relationship between the PHEEM score and burnout [Odds Ratio: 0.57 (0.17–0.88), $p = 0.012$].

We found that residents without burnout had significantly higher PHEEM scores (mean \pm SD: 126.3 ± 16.7) than residents with burnout (mean \pm SD: 106.4 ± 18.6) (95% confidence interval for difference; 14.7–25.0, $P < .001$). PHEEM score differences between the groups of residents with and without burnout is justifiable by the difference in all the three dimensions of emotional exhaustion, depersonalization and reduced personal accomplishment (Table 3).

Regarding the subscales of the PHEEM, we found that scores of all subscales of perceptions of teaching (POT), perceptions of social support (POS) and perceptions of role autonomy (POR) were significantly higher in residents without burnout compared to those who experienced burnout (Table 4).

Multiple linear regression analysis was used to test if the PHEEM subscales independently predicted burnout in the participants. Accordingly, perceptions of social support significantly predicted emotional exhaustion (Table 5).

4. Discussion

Educational environment, as a modifiable factor can influence medical students' burnout, and contribute to the quality of service for patients in teaching hospitals [11]. In view of this, we assessed the relationship between the perceptions of residents about the educational environment with their burnout contextually and found a relationship between the learning environment and burnout and the predictability of PHEEM subscales for residents' burnout. In this study, the prevalence of burnout among residents was similar with Italians, Dutch and Belgian findings [12, 21, 22].

According to the systematic review done by Low et al, burnout was more prevalent among neurology, radiology and general surgery than psychiatry, oncology and family medicine residents [6]. Such differences however, were not observed when we pooled the results among the various specialty subgroups in our study. Since, we pooled results of some specialties for analysis due to low sample size, this might have masked



Figure 1. Flow chart of study participants.

Table 1. Participants' demographic and educational characteristics in relation to burnout status.

	Total number of participating residents (% of total)	Number of residents with burnout (% of total)	p-value of difference in burnout rate per characteristic
Gender [X² (2)= 3.89]			0.143
Male	84 (37.6%)	53 (63.1%)	
Female	137 (62.4%)	96 (70%)	
Year of residency training [X² (3)= 1.77]			0.789
First year	89 (40.2%)	65 (74.1%)	
Second year	67 (30.3%)	49 (73.1%)	
Third year	44 (19.9%)	26 (60%)	
Fourth year	21 (9.5%)	9 (42.8%)	
Type of specialty [X² (2)= 3.53]			0.171
Surgical	95 (42.9%)	63 (66.3%)	
Medical	96 (43.4%)	69 (71.8%)	
Paraclinical	29 (13.1%)	17 (58.6%)	
Marital status [X² (2)= 6.08]			0.107
Married	119 (53.9%)	81 (68%)	
Single	102 (46.1%)	68 (66.6%)	

Chi square test was used for analysis.

Table 2. Maslach Burnout Inventory-Human Service Survey (MBI-HSS) results.

Emotional Exhaustion (EE)	Mean ± SD = 23.5 ± 12.2
High (= >27) N,%	124 (56.1%)
Moderate (14–27) N,%	68 (30.8%)
Low (<14) N,%	29 (13.1%)
Depersonalization (DEP)	Mean ± SD = 8.8 ± 6.2
High (= > 13) N,%	128 (57.9%)
Moderate (4–13) N,%	85 (38.5%)
Low (<4) N,%	8 (3.6%)
Reduced Personal Accomplishment (PA)	Mean ± SD = 27.3 ± 7.7
High (= >37) N,%	86 (38.9%)
Moderate (33–37) N,%	65 (29.4%)
Low (<33) N,%	70 (31.7%)
Total Burnt out N,%	149 (67.4%)

each other causing the absence of a significant difference in the prevalence of burnout.

On the other hand, Tan et al who investigated psychological distress among surgeons in time of COVID-19 was documented that surgeons involved in Head and Neck region surgery to have more psychological distress [23]. Such comparison however was not made since our sample of Head and Neck surgery residents was too limited for interpretation although it is likely. When looked at the COVID-19 pandemicity more burden of clinical work was experienced among internal medicine, infectious diseases and cardiology than specialties such as surgeries and some para-clinical specialties. In the same vein of our study, Chew et al.

showed the prevalence of psychological distress among healthcare workers is independent of the burden of COVID-19 cases [24].

In comparing burnout subscale scores, we found significant differences in “personal accomplishment”, implying that this huge difference in burnout prevalence is justifiable by a lack of personal accomplishment in Iranian residents. There are several possible explanations for this discrepant result ranging from various factors such as professors with multiple responsibilities, and the crowded environment of educational hospitals which takes the chance of feedback and sense of achievement from residents. Also, the score-oriented culture of the Iranian educational system favors the residents’ exam scores to their performance.

Long-lasting negative and stressful working environment often lead to depersonalization [25, 26]. In such instances, contact with patients forms cynical attitudes in the patient-physician relationship. To protect against negative experiences in interaction with a patient, the affected person perceives the patient as an object rather than an individual [27]. In our study, however, emotional exhaustion was attributed to insufficient support from seniors and the finding is concordant with West et al findings on the relationship between stressful communications with supervisors and burnout in residents [28]. Other probable attributes for the exhaustion is the nature of the medical training in which case residents are supposed to deliver medical services on top of their training which would lead to exhaustion. A good support team could not only help to reduce stress, but also to improve quality of care [29]. Therefore, stress could be a possible cause of depersonalization and emotional exhaustion in burnout [30]. It is not surprising that residents with a low perception of teaching and social support have achieved high depersonalization and emotional exhaustion scores in our study.

Table 3. Association between the 3 dimensions of burnout and overall burnout and the mean overall PHEEM scores.

Subscale of Burnout	Status	PHEEM Mean score (SD)	95% CI of difference	p-value
Emotional exhaustion (EE)	Exhausted	107.8 (19.0)	14.8–26.2	<.001
	Not Exhausted	128.3 (15.8)		
Depersonalization (DEP)	Depersonalization	110.5 (19.6)	5.2–18.8	<.001
	No Depersonalization	122.5 (20.3)		
Reduced personal accomplishment (PA)	Not competent	101.3 (22.8)	8.2–20.8	<.001
	Competent	115.8 (18.4)		
Overall burnout	Burnout	106.4 (18.6)	14.7–25.0	<.001
	No Burnout	126.3 (16.7)		

Burnt out means Exhausted: EE > 27, or Depersonalized: DEP>13, or Not competent: PA>37. Independent T test was used for analysis.

Table 4. Comparison of total PHEEM scores and PHEEM subscale scores in residents with and without burnout.

Subscale of PHEEM	PHEEM mean score in residents with burnout	PHEEM mean score in residents without burnout	T statistics	95% CI for difference	p-value
Perceptions of role autonomy	37.8	43.9	T (220) = 4.657	4.3–7.8	<.001
Perceptions of teaching	40.5	49.9	T (220) = 4.555	6.5–12.1	<.001
Perceptions of social support	28.1	32.5	T (220) = 3.782	3.1–5.6	<.001
Total PHEEM	106.4	126.3	T (220) = 4.913	14.7–25.0	<.001

Independent T test was used for analysis.

Table 5. PHEEM subscales as predictors of burnout subscales.

Emotional Exhaustion	R = 0.555; R² = 0.308; P <.001				
	POS	B = -0.75	SE = 0.18	t = -4.10	P = 0.001
	POR	B = -0.42	SE = 0.17	t = -2.36	P = 0.078
	POT	B = -0.12	SE = 0.009	t = -1.76	P = 0.671
Depersonalization	R = 0.430; R² = 0.185; P <.001				
	POS	B = -0.012	SE = 0.007	t = -1.675	P = 0.089
	POR	B = -0.008	SE = 0.104	t = -1.789	P = 0.222
	POT	B = -0.001	SE = 0.004	t = -0.225	P = 0.875
Reduced Personal Accomplishment	R = 0.441; R² = 0.194; P <.001				
	POS	B = 0.381	SE = 0.129	t = 2.955	P = 0.118
	POR	B = 0.283	SE = 0.125	t = 2.258	P = 0.479
	POT	B = 0.394	SE = 0.104	t = 3.789	P = 0.488

Perceptions of role autonomy (POR); Perceptions of teaching (POT); and Perceptions of social support (POS).

As in some other studies [31, 32] and the present study [33, 34], high scores of role autonomy are correlated with lower burnout. Autonomy is considered essential for personal growth, integration, social development and personal well-being [35, 36]. The feeling by the members of an organization that they are able to make autonomous decisions which would also be potentially supported and trusted by the organization helps create an intrinsic motivation and a sense of belonging to the team [21]. Similarly, insufficient autonomy [31] is associated with burnout in residents and such assertion was underscored by Dyrbye et al. who believed that autonomy is essential for medical students as well as other professions [32, 37]. Another dimension of burnout is Personal accomplishment [38] which is important to improve the residents' role of autonomy and improve supervisory and academic support. This phenomenon would in turn enhance the perceived quality of the learning environment and reduce burnout, and therefore, the responsible organization needs to consider the learning environment together with the personal components.

In summary, our findings have some important implications for necessity of developing a support system for residents to receive academic, effective and systemic services from the university. Considering COVID-19 impacts, using internet cognitive behavioral therapy for stressful residents could be a reasonable choice, since its cost-effectiveness and effectiveness in insomnia and eating disorders are approved [39, 40]. In addition to these, revising the assessment system of residents focusing on providing continuous feedback opportunities throughout the course to increase their performance is very essential. Equally important action points are to hold workshops for faculty members in order to communicate effectively with residents, and implementing empowerment courses on time management, well-being, balance between professional and personal life to improve learning environment in relation with burnout.

Thus, generalizability of our findings for other same context in Iran is one of the strengths of this study even though confronted with some limitations like measurement issues. Perhaps trainee-related burnout risk changes with demands of differing rotations. Therefore, we tried to administer the questionnaires in off-peak period of major exams. Most

of the normative data were made up of teachers and social service workers. Although Maslach et al. suggest that participants, due to the potential over-sensitization to the concept of burnout, should not be informed that the instrument is meant to measure burnout, we introduced questionnaire subject at the beginning of the form according to ethical codes for research. Moreover, because of our study's goal (relationship between burnout and satisfaction with educational environment) and the limited number of available residents in a hospital, we had to use different hospitals for data collection; therefore, educational environment and burnout were affected by different hospitals. We also faced some problems like accessing final-year residents because of their limited availability in the clinical wards due to national board exam preparations. Although we found perceptions of social support significantly predicted emotional exhaustion, R² was less than 0.5 and weak.

5. Conclusions

Nearly two in three residents had burnout and this figure is relatively high compared with other studies. Following the observed relationship between the learning environment and burnout in teaching hospitals and the predictability of PHEEM subscales for residents' burnout, we suggest innovative initiatives ranging from improving the clinical environments, reduce workloads and provide social support to all residents as well as encouraging them to involve in other extracurricular activities like listening to music and physical exercises to reduce burnout. These findings may have implications for the design of educational interventions in residency programs to promote the well-being of residents.

Declarations

Author contribution statement

Nastaran Maghbouli, Farzad Fatehi, Mahboobeh Khabaz Mafinejad, Saeed Pourhassan, Amir Ali Sohrabpour & Jemal Haidar Ali: Conceived and designed the experiments; Performed the experiments; Analyzed and

interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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