

Original Research

## Medical Resident Workload at a Multidisciplinary Hospital in Iran

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### Abstract

**Introduction:** Medical resident workload has been shown to be associated with learning efficiency and patient satisfaction. However, there is limited evidence about it in developing countries. This study aimed to evaluate the medical resident workload in a multidisciplinary teaching hospital in Tehran, Iran.

**Methods:** All medical residents at Shariati Hospital, a teaching hospital affiliated with Tehran University of Medical Science, who were working between November and December 2011 were enrolled in this cross-sectional study. A self-reported questionnaire was used to gather information about their duty hours (including daily activities and shifts) and financial issues.

**Results:** 135 (52.5%) out of 257 residents responded to the questionnaire. 72 (53.3%) residents were in surgical departments and 63 (46.7%) were in non-surgical departments. Mean duty hours per month were significantly higher in surgical ( $350.8 \pm 76.7$ ) than non-surgical ( $300.6 \pm 74.2$ ) departments ( $p=0.001$ ). Three cardiology (a non-surgical group) residents (5.7%) and 30 residents (41%) in surgical groups ( $p<0.001$ ) declared a number of "on-calls in the hospital" more than the approved number in the curriculum. The majority of residents (97.8%) declared that their salary was not sufficient to manage their lives and they needed other financial resources.

**Conclusion:** Medical residents at teaching hospitals in Iran suffer from high workloads and low income. There is a need to reduce medical resident workload and increase salary to improve worklife balance and finances.

### Introduction

Physicians generally face physical and mental stressors and often sacrifice their own well-being.<sup>1</sup> This phenomenon is more prominent in their training courses, especially during residencies, in which the work is harder and more stressful.<sup>2,3</sup> Although many studies have been published on the outcome of patient care and quality of life, less attention has been paid to the well-being of clinicians and its influence on patients' health.<sup>1</sup>

It is important to determine the root, prevalence, and consequences of work-related stress in physicians and residents. Sources of stress among residents can be categorized as: 1) organizational problems, including excessive working hours, insufficient human resource, and lack of required instruments and facilities; 2) physical stress due to long working hours, night shifts (on-call in the hospital), and lack of suitable rest facilities; 3) mental stress and anxiety due to pressures by senior physicians and faculty as well as difficulties in clinical decision making; and 4) personal problems, such as marriage issues, family responsibilities, and frequent mood swings.<sup>4</sup>

These stressors may affect residents' quality of life and influence their educational activities and clinical

judgment.<sup>2,5,6</sup> Common responses to stress can include depression, occupational fatigue, irritability, anxiety, and even drug abuse.<sup>3</sup>

In the United States, the Accreditation Council on Graduate Medical Education (ACGME) enacted resident duty-hour standards in July 2003, limiting maximum of weekly workload to 80 hours for all physicians, including residents, in order to provide enough time for rest and personal activities.<sup>7</sup> However, the Iranian Council for Graduate Medical Education has determined a minimum of 50 hours of daily work per week plus a minimum number of night shifts ranging from twelve 18-hour shifts per month for first year residents to six 18-hour shifts per month for fourth year residents.<sup>8</sup> Although many residency program directors do not require their residents to fulfill these minimum duty hours, there is no rule that restricts residents' maximum duty hours. This study aimed to determine the medical resident workload and financial issues in a multidisciplinary teaching hospital in Tehran.

### Materials and Methods

257 residents working in Shariati Hospital, a tertiary

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care multidisciplinary hospital affiliated with Tehran University of Medical Sciences, were enrolled in this cross-sectional study from November to December 2011. A self-reported questionnaire was given to the residents by the hospital deputy of education. The questionnaire consisted of questions about personal information (e.g., year of residency, educational specialty, marital status, number of children), workload, stress rate, and financial situation. Questions about workload included mean number of shifts per month, mean hours of rest during night shifts, mean hours of activity during non-shift days, mean hours of work in the hospital on a vacation day (e.g. visiting patients at the weekend), and the ability to get leave easily based on department scheduling. Their stress rate was assessed by a Likert-type scale that consisted of the following choices: minimal, moderate, high, and very high. The financial section included questions about their need for additional financial resources for living (in addition to their educational salary) and the sources of their living costs. An open-ended question was also provided for comments and suggestions.

Content validity of the questionnaire was established by an expert panel consist of six faculty members with administrative leadership roles in the residency program. The questionnaires were designed and distributed anonymously without including the variables (e.g. age or gender) that could reveal the identity of the participants. The survey was pilot tested with residents over the period of one month and revisions were made to clarify items.

Residents were classified into surgical and non-surgical groups based on their discipline. A general index for monthly workload in hours (mean total working hours in a month) was calculated by using the following formula:

$$(\text{Number of in-hospital on-call shifts per month} \times \text{work hours per shifts}) + (\text{Number of regular days} \times \text{work hours in each regular day}) + (\text{Number of vacation days} \times \text{working hours in each non-shift vacation day})$$

In order to make this index comparable to other countries, a weekly workload variable was calculated by multiplying the monthly workload by 7/30. At the time of this study, medical residents did not receive an official salary with job-related benefits in Iran, but an educational subsidy was paid to offset their living costs. To express the financial needs of residents (that exceeded the educational subsidy), an income to expenses ratio was calculated by dividing their educational subsidy by the amount of their mean living costs (expressed as a percentage).

All statistical analyses were performed using SPSS version 13.0 (SPSS Inc., Chicago, IL). The quantitative variables were described using mean and standard deviation (SD) or median and interquartile range (IQR) when the distribution was not normal. Qualitative variables were described using frequency and percentage. A chi-square test was used for comparing qualitative variables. The Student t-test and Mann-Whitney U-test were used to compare continuous variables as appropriate.  $P < 0.05$  was considered statistically significant.

## Results

A total of 135 (52.5%) residents out of 257 responded to the survey. Seventy-two (53.3%) residents were in surgical departments and 63 (46.7%) were in non-surgical departments. Eighty-seven (63.7%) of participating residents were married. The general characteristics of participating residents are shown in Table 1.

Workload indicators are summarized in Table 2. Forty-two residents (31.1%) had to attend the hospital and visit patients on all seven days per week, even on vacations. In addition, only 27 residents (20%) stated that they could easily get a leave if requested. Residents reported their opinion about the stress level in their working environment as follows: 3 cases (2.2%) reported no stress, 5 cases (3.7%) reported moderate stress, 40 cases (29.6%) reported high stress in, and 86 cases (63.7%) reported very high stress in. Among 114 residents who had mentioned number of their night shifts, 28 participants (20.7%) reported more than the usual number of night shifts as determined by the national curriculum. The number of night shifts more than the curriculum-defined number was 5.7% in the non-surgical group and 41% in the surgical group ( $p < 0.001$ ).

A general index of mean workload was calculated for 106 residents based on the aforementioned formula. The overall average of weekly working hours was  $75.9 \pm 18.4$  hours. The mean weekly workload was  $81.1 \pm 18.5$  and  $70.4 \pm 16.9$  hours for surgical and non-surgical residents, respectively ( $p = 0.002$ ). The highest workload was found for residents in neurosurgery (mean  $92.9 \pm 6.0$  hours per week), orthopedics (mean  $92.6 \pm 24.2$  hours per week), and general surgery (mean  $90.7 \pm 19.6$  hours per week).

Almost all residents (132, 97.8%) declared that they needed other financial resources in addition to the educational subsidy to manage their living costs. The mean income-to-expenses ratio was  $0.5 \pm 0.2$ . Sources of additional income included: moonlighting in 4 cases (3%), using personal savings in 30 cases (22.2%), non-medical activities in 4 cases (3%), financial support by their families in 25 cases (18.5%), financial support by the spouse in 5 cases (3.7%), and unspecified sources in 64 cases (47.4%). Among 128 residents who answered the question about renting an accommodation, 89 (69.5%) cases were paying rental costs.

Residents' recommendations regarding feasible solutions for financial issues (gathered from responses to the open-ended question) are summarized in Table 3.

## Discussion

Residency is one of the most difficult and stressful training courses in medical education, and stresses due to different factors result in unfavorable effects on residents' lives. Evaluation of these problems in residents may provide invaluable information for improving the educational situation for this group of trainees, their subsequent professional performance, and quality of care to patients in teaching hospitals.

Resident workload from participants in our study as well as other studies is shown in Table 4. In a cross-sectional

**Table 1.** Baseline characteristics of residents in the study (N=135)

Variables	Results number (percent)
<b>Marriage</b>	
Married	86 (63.7)
Single	14 (36.3)
<b>Specialized department</b>	
Gynecology	20 (14.8)
Cardiology	15 (11.1)
Internal medicine	14 (10.4)
Anesthesiology	13 (9.6)
Pathology	12 (8.9)
General surgery	11 (8.1)
Orthopedics	10 (7.4)
Neurosurgery	8 (5.9)
Neurology	8 (5.9)
Nuclear medicine	7 (5.2)
Radiology	7 (5.2)
Oral and Maxillofacial Surgery	7 (5.2)
Urology	3 (2.2)
<b>Post Graduate Year</b>	
One	33 (24.4)
Two	35 (25.9)
Three	23 (17)
Four	22 (16.3)
Five	2 (1.5)
Unknown	20 (14.8)
Number of children, median (IQR)	0 (0-1)*

\*Number of children, Median and interquartile range

survey in Karachi, surgical residents worked more than other groups (9). The workload of surgical residents in our country is similar to that of Pakistani residents. The mean hours of workload in residents in the United States has decreased after enactment of limits on resident workload by ACGME.

In a Canadian study that was published by Teichman et al. in 2005, 62% of residents reported educational debt, 39% reported credit card debt, 36% reported a deficit in income-to-expenses ratio, and 25% reported available cash less than 275 dollars.<sup>10</sup> Considering major differences in economic issues in our country, financial issues are basically very different and comparison with other studies may not be feasible. However, it seems that the medical residency course is associated with serious financial restrictions in most countries where this issue has been studied. It is obvious that the minimums for living should be provided to all working groups in a society, including medical residents. The income of medical residents in Iran was about half of their total living expenses at the time of this study. This means that their official income from the hospital was far below the poverty threshold. Thus, residents mostly depend on their families for financial support during their residency and many of them may not be able to fully concentrate on their educational requirements and patients' clinical care. For instance, average rental accommodation in Tehran costs more than monthly salary of residents. Investigations have shown that financial difficulties have a significant influence on

residents' education, burnout, attention to patients, and quality of therapeutic services.<sup>11</sup> Therefore, authorities should seek a way to solve this problem and find a way to increasing residents' income.

Some strategies recommended by residents may be helpful. A principal concern was "Timely payment of the educational subsidies to the first year residents". This requires an improvement in administrative processes. Another recommendation is "increasing the amount of [the] educational salary". Currently, hospitals are facing many financial problems and may need more national support to be able to help residents. A budget allocation, to be performed via senior authorities of the Medical University or Ministry of Health and Medical Education, may be necessary. It may also be necessary to consider differences in the living expenses in large versus small cities and adjust for those differences.

"Payments based on the workload" was among the other recommendations. It seems rational that the workload in different departments should be considered. In order to achieve this goal, some solutions, such as "fee for service" or "compensation for radiation exposure", have been recommended. In addition, other recommendations, such as the "definition of a maximum allowed workload" and "decreasing the number of night shifts" were included. "Providing an opportunity for moonlighting at the teaching hospitals" was another strategy suggested by the residents. In fact, some residents are working in other hospitals, but they prefer to perform extra work in their own educational center. However, some departments require residents to work more than the hours defined by the national curriculum without financial compensation for this additional work.

One of the limitations of this study was the moderate response rate (55.6%). Similar studies in other countries via self-reported questionnaires among residents have reported participation rates of 16% to 100%.<sup>10,12</sup> This research was based on self-reports by the residents using direct questions from residents. For accurate data gathering, other sources of information may be necessary. Asking indirect questions (home rental costs, payment by installment for house or automobile, debt, etc.) may provide more reliable information. Therefore, it is recommended to perform similar investigations in other centers. Another limitation that should be noted is that age and gender were not included in the questionnaire since some departments had only one male or female resident and thus those variables could reveal their identity. As a result, we were not able to categorize and analyze based on gender and age. Our findings should be interpreted with caution, because our classification for surgical and non-surgical departments did not take into consideration differences between various specialty fields. For example, the workload of cardiology residents differed significantly from that of nuclear medicine residents. Because of limitations in the sample size of this study, differences in each specialty were not compared statistically. Designing investigations with larger sample sizes may provide more

**Table 2.** Workload indicators in the medical residents

Indicator	Mean	Standard deviation	Range (min-max)
Hours of work in a regular days	8.7	2.9	2-17
Hours of work in an on-call shifts at the hospital	8.7	4.1	0-20
Hours of rest during the on-call shifts	4.4	3.3	0.5-18
Number of visit hours during a non- shift vacation day *	3.9	3.1	1-20
Months being off the hospital just before graduation	4.3	3.1	0-12

\*calculated only for 42 residents who did actually visit patients on vacation days

**Table 3.** Summary of recommendations by the residents for overcoming financial problems

1	Payment of educational subsidy to the first year residents without delay
2	Increasing the amount of educational subsidy
3	Direct financial support by the hospital council of trustees
4	Payment based on the workload
5	Developing fee-for-service for the resident
6	compensation of radiation exposure for the residents
7	Providing loans to residents
8	Providing facilities at the hospital where residents can work while on non-duty hours
9	Providing dormitory facility for married residents
10	Considering a maximum for weekly workload

**Table 4.** Resident workload in different countries

Investigation	Country	Year	Surgical residents (hour per week)	Non-Surgical residents (hour per week)
Avan et al <sup>9</sup>	Pakistan	2006	99.7	96.9
Barger et al <sup>11</sup>	USA	2005	70.7	NR
Lockley et al <sup>12</sup>	USA	2004	-	84.9
Our study	Iran	2012	90.1	74.7

\* NR: not reported

accurate information in this matter. This study also did not cover all specialties: some omitted were pediatrics, ENT, ophthalmology, psychiatry, and dermatology.

### Conclusion

Medical Residents in Iran face high workloads in stressful conditions with insufficient income and concomitant economic problems. Surgical residents experience even higher workloads.

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