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Working hours of interns and internal medicine residents: a cross sectional study

Background: Duty hours for internships and residents have received globally criticism in recent years. Working hours highly affect the trainees' well-being, patient care, and education programs. There is no consensus about the benefit of reducing working hours. The present study aimed to assess how reducing the working hours can influence interns on some aspects of training, well-being, and patient care.

Method: This study was conducted in Internal Medicine Department of Imam Reza Hospital in Mashhad University of Medical Sciences, Iran. The present researchers reduced the working hours from 20 to 10 hours in a shift for 6 weeks in their department for interns, as well as a self-administered and validated questionnaire, which has previously been evaluated for the validity and reliability, was given to internal medicine residents and interns. At the end of the study, data were analyzed by SPSS.

Results: A total of 11 residents and 23 interns completed the survey. Limited working hours had significant beneficial effects according to participants' opinions in many domains with duty hour restrictions ($P < 0.05$). These included subdomains such as, increasing training and participating in their classes, well-being, improving the quality of file completion, more responsibility, better history taking, and less medical mistakes.

Conclusions: As indicated, 83% of residents and 73% of interns reached a consensus on reducing the working-hours of the clinical rounds in many subdomains with duty hour reform. Their perceptions showed critical benefits in ability to deliver patient care, education, and well-being after duty hour restriction.

Key words: Duty hour restriction, Work hour reduction, Workload, Intern, Resident

ساعات عمل المتدربين والمقيمين في الطب الباطني: دراسة مقطعية

الخلفية: تعرضت ساعات العمل للمتدربين والمقيمين لانتقادات عالمية في السنوات الأخيرة. تؤثر ساعات العمل بشكل كبير على رفاة المتدربين ورعاية المرضى وبرامج التعليم. لا يوجد إجماع حول فائدة تقليل ساعات العمل. تهدف الدراسة الحالية إلى تقييم كيف يمكن لتقليل ساعات العمل أن يؤثر على المتدربين في بعض جوانب التدريب والرعاية ورعاية المرضى.

الطريقة: أجريت هذه الدراسة في قسم الطب الباطني بمستشفى الإمام رضا في جامعة مشهد للعلوم الطبية، إيران. قام الباحثون الحاليون بتقليل ساعات العمل من 20 إلى 10 ساعات في نوبة لمدة 6 أسابيع في قسمهم للمتدربين، بالإضافة إلى استبيان تم إدارته ذاتيًا وتم التحقق من صحته، والذي تم تقييمه مسبقًا من حيث الصلاحية والموثوقية، تم إعطاؤه للمقيمين والمتدربين في الطب الباطني. في نهاية الدراسة، تم تحليل البيانات بواسطة برنامج SPSS.

النتائج: أكمل 11 مقيمًا و 23 متدربًا الاستبيان. كان لساعات العمل المحدودة تأثيرات مفيدة كبيرة وفقًا لآراء المشاركين في العديد من المجالات ذات قيود ساعات العمل ($P < 0.05$). وقد شملت هذه المجالات الفرعية، مثل زيادة التدريب والمشاركة في فصولهم الدراسية، والرعاية، وتحسين جودة استكمال الملفات، والمزيد من المسؤولية، وتحسين تدوين التاريخ المرضي، وتقليل الأخطاء الطبية.

الاستنتاجات: كما هو موضح، توصل 83% من المقيمين و 73% من المتدربين إلى إجماع بشأن تقليل ساعات العمل في الجولات السريرية في العديد من المجالات الفرعية مع إصلاح ساعات العمل. وأظهرت تصوراتهم فوائد بالغة الأهمية في القدرة على تقديم رعاية المرضى والتعليم والرعاية بعد تقييد ساعات العمل. **الكلمات المفتاحية:** تقييد ساعات العمل، تقليل ساعات العمل، عبء العمل، المتدرب، المقيم

ساعات کار کارورزان و دستیاران داخلی: یک مطالعه مقطعی

زمینه و هدف: ساعات کاری برای کارآموزان و رزیدنت‌ها از جمله مسائلی است که در سال‌های اخیر به طور جهانی مورد انتقاد قرار گرفته است. ساعات کاری به شدت بر روی سلامت و رعایت اصول مراقبت از بیماران و برنامه های آموزشی کارآموزان تأثیر می گذارد. امروزه اجماعی درباره فواید کاهش ساعت کاری وجود ندارد. هدف از انجام این مطالعه ارزیابی آنست که چگونه کاهش ساعت کاری می‌تواند بر برخی جنبه‌های آموزشی، سلامت و مراقبت از بیماران در کارآموزان تأثیر بگذارد.

روش: این مطالعه در بخش داخلی بیمارستان امام رضا در دانشگاه علوم پزشکی مشهد، ایران انجام شد. ما ساعت کاری را برای کارآموزان از 20 ساعت به 10 ساعت در یک شیفت برای 6 هفته کاهش دادیم و یک پرسشنامه معتبر به رزیدنت‌های بخش داخلی و کارآموزان داده شد. در پایان مداخله، داده‌ها با استفاده از نرم افزار SPSS تحلیل شدند.

یافته‌ها: یازده رزیدنت و 23 کارآموز پرسشنامه‌ها را تکمیل کردند. بر اساس نظرات شرکت کنندگان مطالعه، محدودیت ساعت کاری تأثیر معنادار و مفیدی در بسیاری از زمینه‌ها با کاهش ساعت کاری داشت ($P < 0.05$) که شامل زیرشاخه‌هایی مانند افزایش آموزش و شرکت در کلاس‌ها، احساس بهتر، بهبود کیفیت تکمیل پرونده، مسئولیت پذیری بیشتر، گرفتن شرح حال بهتر بیمار و اشتباهات پزشکی کمتر بود.

نتیجه گیری: هشتاد و سه درصد از رزیدنت‌ها و 73 درصد از کارآموزان با تغییر برنامه ساعت کاری به توافق در خصوص کاهش ساعات کاری رسیدند. دیدگاه‌های آنها فواید مهمی در توانایی مراقبت از بیمار، آموزش و بهبود سلامت پس از کاهش ساعت کاری دربرداشت.

واژه های کلیدی: کاهش ساعات کاری، محدودیت ساعات کاری، کارآموزان، رزیدنت

انترن اور اندرونی ادویات کے رہائشیوں کے کام کے اوقات: ایک کراس سیکشنل اسٹڈی

پس منظر: حالیہ برسوں میں انٹرنشپ اور رہائشیوں کے لیے ڈیوٹی کے اوقات کو عالمی سطح پر تنقید کا سامنا کرنا پڑا ہے۔ کام کے اوقات تربیت یافتہ افراد کی فلاح و بہبود، مریضوں کی دیکھ بھال، اور تعلیمی پروگراموں کو بہت زیادہ متاثر کرتے ہیں۔ کام کے اوقات کم کرنے کے فائدے کے بارے میں کوئی اتفاق رائے نہیں ہے۔ موجودہ مطالعہ کا مقصد اس بات کا اندازہ لگانا ہے کہ کام کے اوقات کو کم کرنے سے تربیت، بہبود اور مریضوں کی دیکھ بھال کے کچھ پہلوؤں پر انٹرنز کو کیسے متاثر کیا جا سکتا ہے۔

طریقہ: یہ مطالعہ مشہد یونیورسٹی آف میڈیکل سائنسز، ایران میں امام رضا ہسپتال کے اندرونی طب کے شعبہ میں کیا گیا۔ موجودہ محققین نے انٹرنز کے لیے اپنے ڈیپارٹمنٹ میں 6 ہفتوں کی شفٹ میں کام کے اوقات کو 20 سے کم کر کے 10 گھنٹے کر دیا، ساتھ ہی ایک خود زیر انتظام اور تصدیق شدہ سوالنامہ، جس کی درستگی اور وشوسنییتا کا پہلے جائزہ لیا جا چکا ہے، اندرونی کو دیا گیا۔ طب کے رہائشی اور انٹرنز۔ مطالعہ کے اختتام پر، SPSS کے ذریعہ ڈیٹا کا تجزیہ کیا گیا۔

نتائج: کل 11 رہائشیوں اور 23 انٹرنز نے سروے مکمل کیا۔ ڈیوٹی گھنٹے کی پابندیوں کے ساتھ بہت سے ڈومینز میں شرکاء کی رائے کے مطابق محدود کام کے اوقات کے اہم فائدہ مند اثرات تھے ($P < 0.05$)۔ ان میں ذیلی ڈومینز شامل ہیں جیسے، تربیت میں اضافہ اور ان کی کلاسوں میں شرکت، بہبود، فائل کی تکمیل کے معیار کو بہتر بنانا، زیادہ ذمہ داری، بہتر تاریخ لینا، اور کم طبی غلطیاں۔

نتیجہ: جیسا کہ اشارہ کیا گیا ہے، 83% رہائشی اور 73% انٹرنز ڈیوٹی آور اصلاحات کے ساتھ بہت سے ذیلی ڈومینز میں کلینیکل رائٹنڈز کے اوقات کار کو کم کرنے پر اتفاق رائے پر پہنچ گئے۔ ان کے تاثرات نے ڈیوٹی گھنٹے کی پابندی کے بعد مریضوں کی دیکھ بھال، تعلیم اور فلاح و بہبود کی صلاحیت میں اہم فوائد ظاہر کیے ہیں۔

کلیدی الفاظ: ڈیوٹی گھنٹے کی پابندی، کام کے اوقات میں کمی، کام کا بوجھ، انٹرن رہائشی

INTRODUCTION

Work hour restriction has been a highly significant and enduring topic in the field of medicine, emphasizing its continued importance and necessity for further investigation (1, 2). According to the various moral and legal considerations, work hour limitation has spurred in many regions (3). Residents play a vital role in patient care, even during shifts lasting more than 24 hours, as they are engaged in educating interns (4). To accomplish this objective, it is crucial for residents to have responsible and active interns by their side. According to the Accreditation Board for Graduate Restorative Education (ACGME) 2011 Duty Hour Standards, recommended maximum work per week and direct patient care shift should be 80 hours and 24+4 hours, respectively (5) and it has been emphasized that duty-hour restrictions have critical effects on the work efficiency. Saltzman et al. conducted a study in 2017, adhering to the guideline that imposed an 80-hour limitation. The duty hours in the orthopedic program were reduced from 30 hours to 16 hours, resulting in compromised outcomes and a lack of agreement on improving both education and patient outcomes (6). A systematic review evaluating resident duty hours' restriction in surgery found a negative effect of duty hour restriction on patient outcomes and residents' performance as well as their well-being; therefore, it recommended more flexibility on resident needs (7). In Iran, internal medicine residents work an average of 84 hours per week, exceeding the working hours of most European countries (40-52.5 hours per week) and the United States (80 hours per week) (8). In addition, medical failures caused by resident lethargy may now be supplanted by decreased continuity of care (9). Lack of sleep and the duty hours of trainees have made significant clinical mistakes and dysfunction, antagonistic occasions, and impaired working memory limitations. Studies have indicated a relationship between long work hours and expanded working injury and burnout. Lack of sleep has been connected to diminished specialized capability, disabled neuropsychological testing, and less precise ECG translation (10, 11).

A survey on 141 Iranian medical interns revealed that the duty-hour shift of medical interns should be reassessed so that they can achieve the objective of optimizing learning potential to its fullest extent (12). Therefore, further studies are required to evaluate work hour limitations in developed and less developed countries. Imam Reza hospital is one of the most important teaching and referral hospitals of Mashhad University of Medical Sciences, experiencing a high volume of patient admissions every night, which has a negative effect on trainees and patient care. In order to assist medical interns and educators, this study was performed to evaluate the positive and negative effects of duty-hour shifts on trainees and potentially patient care.

METHODS

This project was conducted from January to March 2019. This experimental and quasi-experimental study recruited 23 interns and 11 residents from the Internal Department of Imam Reza hospital in Mashhad, Iran. Imam Reza hospital

serves as the primary teaching hospital for the internal medicine residency program in Mashhad. However, in the four-year residency program in internal medicine, 11 residents, with five in senior positions and six in grades one to three, participated in this study. For six weeks, all residents and interns had the full working hours of 20 as usual. For the following six weeks, the study was implemented by reducing only the working hours of the interns to 10 hours. Senior residents in every shift were responsible for conducting clinical and teaching rounds with interns at the end of the shift, discussing patients who would be presented in the next morning report. Other residents in grades 1 to 3 of their residency program maintained on close contact with interns, assisting them in approaching, diagnosing, and treating patients, as well as supervising their work. Each day, one group of interns was assigned the responsibility of presenting patients in the morning report. The perceptions of residents and interns regarding duty hours were examined at the end of the study.

Respondents who completed the questionnaire were included in the analysis. The questionnaire, which has previously been evaluated for its validity and reliability, consisted of eight common questions related to the following aspects: 1) the benefit of training provided by the chief resident, 2) reduction of medical errors, 3) increased responsibility, 4) improved history taking and physical examination skills, 5) enhanced peace of mind, 6) improved quality of file completion, 7) possibility of conducting clinical rounds at the end of the shift, and 8) the group of interns responsible for presenting in morning reports. Moreover, the interns' questionnaire had 3 more specific questions including 1) feeling better, 2) improving individuals' life, and 3) attending in their classes with better quality on the next day. Protocol of the current study was approved by the ethics committee of Mashhad University of Medical Sciences.

The responses to each question on the questionnaire were aggregated in terms of frequency, represented as a percentage. Subsequently, the collected data was acquired and subjected to be analyzed using SPSS. *P*-value of <0.05 was used to indicate statistically significant difference.

RESULTS

As indicated in table 1, there is no significant difference in opinions regarding short shift satisfaction between residents in the years 1-3 and senior/supervising residents. However, a significant difference was observed between the opinions of interns and both groups of residents.

Table 2 presents the opinions of interns and residents in six separate subdomains. According to this table there is no significant difference between residents and interns regarding active participating in training classes the next day, increasing the benefits of on-call training rounds, feeling better and improving individuals' lives. However, they reported divergent opinions on reducing medical errors, feeling more responsible, being more accurate in history and physical examination, increasing peace of mind, and improving the quality of file completion.

The investigation of the relationship between the opinions of interns and residents regarding the feasibility of conducting

a clinical round for the benefit of both the first and second internship shifts showed that it is not possible to have a clinical round that can effectively serve both groups of interns.

Overall, 94% of residents and 72% of interns believed that it is not feasible to conduct clinical teaching rounds for both groups of interns in the same shift, and only one group can participate in clinical rounds to discuss patients being presented in the next morning report. There was disagreement between interns and residents regarding whether the first or second shift of interns could present in the morning report.

According to Figure 1, interns and residents are more inclined to agree on introducing a third form of presentation in the morning report by interns.

DISCUSSION

The present study used a validated questionnaire to determine changes in medical internships' training and

residents' perceptions after the implementation of work hour restrictions for interns. Based on the results, 82% of residents disagreed with "taking on more responsibility" and 72% disagreed with "reducing medical errors through work hour restrictions" for interns. However, 69% of interns shared the same opinion regarding increased responsibility and 65% agreed that reducing medical errors could be achieved by eliminating working hours. Additionally, 69.5% of interns reported improvements in well-being and increased quality of life. The results of a systematic review by Levine et al. showed that resident's short shifts improved the quality of

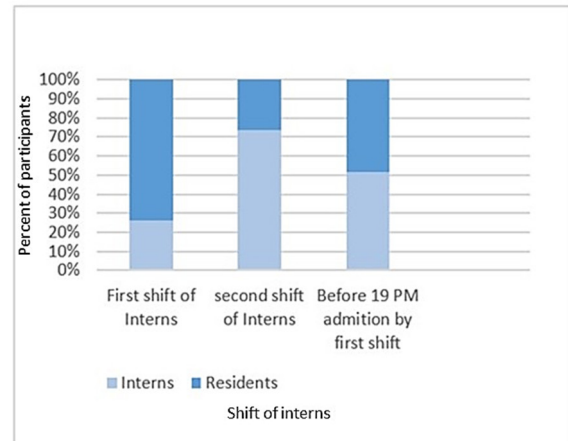


Figure 1. Opinion of interns and residents about responsibility of interns for presenting admitted patients in the morning report

Table 1. Difference in opinions regarding short shift satisfaction between interns, residents in the years 1-3 and senior residents

Groups	P-value
1-3 year residents	0.44
Senior residents	
Interns with 1-3 year residents	0.002
Interns with senior residents	0.04

Table 2. Opinion of interns and residents about 6 questions separatel

Question topic	Participants	Completely disagree	Disagree	Neutral	Agree	Completely agree
1.Participate more actively in training classes the next day	Residents	18.2%	0%	63.6%	18.2%	0%
	Interns	11.5%	0%	11.5%	42.3%	34.6%
2.Increased training of the clinical rounds during shift	Residents	39.8%	33.3%	11.1%	11.1%	5.6%
	Interns	23.1%	23.1%	7.7%	34.6%	11.5%
3.Improved well-being	Residents	36.4%	18.2%	27.3%	0%	18.2%
	Interns	11.5%	15.4%	7.7	26.9%	38.5%
4.Improved individual life	Residents	36.4%	27.3%	9.1%	27.3%	0%
	Interns	19.2%	11.5%	19.2%	15.4%	34.6%
5.Reduced medical errors	Residents	23.5%	23.5%	35.3%	11.8%	5.9%
	Interns	12.0%	4.0%	16.0%	36.0%	32.0%
6.Increased responsibility	Residents	44.4%	33.3%	11.1%	5.6%	5.6%
	Interns	7.7%	11.5%	11.5%	38.5%	30.8%
7.Better history taking and physical examination	Residents	27.8%	16.7%	33.3%	16.7%	5.6%
	Interns	11.5%	3.8%	3.8%	46.2%	34.6%
8.Increased peace of mind	Residents	22.2%	22.2%	16.7%	33.3%	5.6%
	Interns	11.5%	19.2%	30.8%	0%	38.5%
9.Improved the quality of file completion	Residents	27.8%	27.8%	16.7%	27.8%	0%
	Interns	12.0%	4.0%	12.0%	48.0%	24.0%

life for residents, patient safety, and the overall quality of care (13). In line with these findings, another research study reported a better ability to manage healthcare and educational programs as a result of reducing work hours (4). The present study investigated the opinions of residents and interns on various aspects related to changing duty hours. Interns agreed that the reduction in working hours may improve the quality of file completion and increase the effectiveness of on-call training clinical rounds, while residents did not completely agree with this idea. Barrack et al. specifically studied duty impairments and showed a positive correlation between the length of duty hours and burnout (14).

In the present study, residents mostly disagreed with reducing working hours for interns, whereas interns mostly agreed with reducing working hours and believed that it can cause more responsibility, better concentration, history taking, physical examination, increasing peace of mind and probably decreasing medical errors, improving individual's life, feeling better, and participating more actively in training classes on the next day. Furthermore, Nagasaki et al., in a cross-sectional study among 5579 residents in Japan, demonstrated that duty hours exceeding 90 hours per week can result in reduced sleep duration, exacerbate insomnia symptoms, and have adverse effects on well-being and medical safety. Although no significant correlation was found between sleep duration and medical errors, the presence of insomnia increased the risk of such errors. Implementing limits on duty hours for residents to prevent excessive workloads can promote better sleep, improve resident well-being, and decrease medical errors associated with insomnia (15). In contrast to this study, research performed by Parshuram et al. demonstrated that medical errors increase with shorter duty hours, possibly due to the large number of patient handoffs (16). Nishigori et al. indicated that residents' private lives influence their duty hours; those who felt more stressed also experienced more pressure at work (3). However, the present study showed that duty hours may impact the quality of life.

In our study, according to the program rules, interns have responsibilities such as taking history and physical exams, introducing patients, and following up on morning reports. Therefore, having two groups of interns at night, based on residents' opinions, can lead to problems and mismanagement of patients. However, based on interns' expectations of the working shift as a learning environment, they agreed with reducing working hours and experiencing less fatigue to facilitate better learning. Interns believed that reducing working hours would result in better responsibility, improvement in patient documentation and history taking, as well as it reduces medical errors, improves performance, increases participating in their classes the next day after the shift and overall better quality of life and well-being. Residents and interns agreed on the challenge of assigning responsibility to interns for the morning report through divided shifts. Regarding the study, one problem would be finding a way to present patients in the morning report by either the first or second group of interns in hospitals with high patient load. It seems that when patients are admitted

by 7 pm, the first group of interns has a 3-hour window to approach and diagnose the patients as they are responsible for their presentation in the morning report. It would be better that admissions after this time be presented by the second group of interns.

A research performed by Moeller et al. indicated that duty hours reduction would enhance the medical education level with more effective teaching and learning and increase well-being in medical skills (4). Another study has concluded that beneficial learning setting create a balance between work requirements and a chance for educating (17). Medical residents undergo a demanding phase of intense learning that involves a great workload and complex tasks. When examining the work organization of medical residents, it is crucial to consider not only providing adequate time for rest but implementing effective time management practices for their daily events. Hence, it becomes possible to mitigate the negative consequences associated with long working hours. This holistic approach to evaluation ensures that residents are equipped with the necessary tools to optimize their workflow, maintain a healthy work-life balance, and minimize potential adverse outcomes (18). According to the recent findings, the utilization of a mobile app-based gamified team competition has demonstrated a significant increase in daily physical activity among medical interns. These results suggest that team competition implemented through a mobile platform can effectively serve as an intervention tool for promoting short-term physical activity levels in this specific group (19).

A group qualitative investigation on 17 internal medicine residents which recruited from different years of residency training suggested that by mitigating the sources of perceived time pressure, residents' well-being and patient care outcomes can be improved. Furthermore, the study suggested that perceived time pressure may compromise the quality of patient care and overall performance. This can potentially impact clinical decision-making, accuracy in diagnoses, and appropriate treatment planning. Strategies aimed at reducing time pressure and promoting work-life balance among residents may include optimizing workflow processes, allocating adequate resources, implementing efficient scheduling systems, and fostering a supportive learning environment (20).

An international comparative analysis on residents' working hours, with the assistance of experts from 14 high-income countries, provided valuable insights into the variations and similarities in work hours across different regions. By using a standardized qualitative data collection method, it has been recognized that in the regions including North American and European countries, residents experience long hours of work. It's interesting to note that efforts to eliminate working hours for residents have shown mixed effects on residents' quality of life, quality of care, and education. Moreover, this analysis can provide valuable perceptions for refining policies and practices related to residents' working hours and optimizing the balance between resident well-being and optimal patient care (21). Similarly, the results of the present survey showed significant improvements and satisfaction for interns,

which should be noticed in new models of working hours. The findings of residents and interns' questionnaire about duty hour restrictions for interns is important to create an effective on-call program. The present study helps educational policy makers to plan efficiently for the medical interns and residents in order to reduce job burnouts.

LIMITATIONS

This study merits some limitations. First, it recorded subjective view of implementation, rather than objective measurements, such as patient's outcome and interns or residents' performance on approved learning evaluations. Second, this research was conducted in a single-center of internal medicine program, which can be regarded as a weak point for the present study. Further studies with larger sample sizes allowing quantitative analyses are required for more certain and significant results.

CONCLUSION

Duty hour restrictions for trainees are now one of the most challenging topics, aiming to strike a balance between training and patient care in high load hospitals. The beneficial impacts of duty hour restrictions include increased training opportunities, active participation in classes,

improved well-being, enhanced quality of file completion, increased responsibility, better history taking, and potentially fewer medical errors. This study revealed contrasting opinions between interns and residents when the restriction in working hours is limited to only interns, highlighting an important perspective in this medical research field.

Ethical considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors. The ethics committee of Mashhad University of Medical Sciences approved this research, ethics code: IR.MUMS.REC.1399.297

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