

Factors contributing to physician overwork in 80 Saiseikai hospitals of Japan

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Abstract

Background

Physician overwork and burnout is a prevalent problem worldwide that is hazardous to both the physician's health and healthcare quality and safety in hospitals. The aim of this study was to estimate how much time physicians spend on various work activities and to what extent these activities contribute to the total number of working hours, so as to find an effective way to reduce the number of overtime hours.

Methods

Surveys were conducted on fulltime physicians of 80 Saiseikai hospitals. For those activities showing a significant positive association with the number of total working hours, the hospital-based time for one patient-day, which is the daily number of hours spent by all physicians in the hospital for one patient, was analyzed in association with the number of patient-days per physician in the hospital. The time spent by a physician for each work activity was also analyzed in association with the number of patient-days per physician, after controlling for sex, age, department and position as covariates.

Results

Analysis of 1,837 physicians showed that most work activities had a significant positive association with the total number of working hours. In general, the time spent on direct and indirect inpatient services were greater than other work activities. The hospital-based time for one patient-day showed a significant inverse association with the number of patient-days per physician in all work activities, except that of working in surgical operation room. On the other hand, individual physicians tended to spend a similar amount of time regardless of the number of patient-days per physician in the hospital. In hospitals with a relative shortage of physicians, physicians tended to spend less time on each patient, whereas in hospitals with a relative surplus of physicians, physicians tended to spend more time, presumably more than necessary, on patient services.

Conclusion

Improvement in efficiency, such as by reducing the time interval between patient services, seems promising in hospitals with a relative surplus of physicians. Time could also be saved by implementing newer methods of information technology or by shifting a part of tasks to other health professionals and clericals.

Background

Physician overwork and burnout is a prevalent problem worldwide [1] that is known to be hazardous to the physician's health and poses a challenge for healthcare quality and safety in hospitals [2–4]. In 2018, the Ministry of Health, Labor and Welfare of Japan decided to introduce regulations limiting the number

of working hours for physicians [5], but this was postponed to the year 2024 mainly because this 5-year period was thought to be necessary to implement means of reducing the number of physician working hours effectively while maintaining the quality and quantity of healthcare services nationwide.

A physician's daily work is complicated. It depends on various factors such as sex, age, specialty, and position [6–8]. It also depends on the role of the hospital in the community. Acute-care hospitals emphasizing on emergency care are generally busier than other community hospitals. As such, efforts to decrease physician working hours should take into account the type of work activities as well as hospital characteristics.

The Saiseikai Imperial Gift Foundation, Inc. (Saiseikai, hereafter) is one of the world's largest social welfare organizations [9]. As of 2018, eighty hospitals of various sizes from different locations are in operation throughout Japan and the total number of fulltime physicians exceeds four thousand. This gave us a unique opportunity to investigate the current status of physician overwork and burnout in relation to various work activities in different types of hospitals.

The aim of this study was to estimate the amount of time physicians spent on various work activities and to what extent these activities contributed to the total number of working hours, so as to find an effective way to reduce the number of physician overtime hours both in Japan and worldwide.

Methods

Two kinds of questionnaire surveys were used; hospital surveys and physician surveys. The hospital questionnaire was designed to collect information about the current status of hospital structure and functions, and how the number of physician working hours was being regulated in hospitals. The physician questionnaire was designed to collect information anonymously about regular working hours of all fulltime physicians in 80 Saiseikai hospitals.

Using the data obtained from physician questionnaire, the weekly hospital hours of each physician was calculated from the self-reported arrival and departure timings in one week, and the weekly hospital working hours was estimated by subtracting nonworking hours spent by the physician for his/her own purpose, such as studying for specialty license, from the weekly hospital hours. The number of hours for sleep and rest during the night and holiday shifts was also included in nonworking hours. The weekly number of overtime hours for each physician was calculated by subtracting the legal working hours (40 hours a week in Japan) from the weekly working hours obtained as mentioned above. The upper limit of the annual number of overtime hours, which will be enforced in 2024, is 960 hours for hospital staff physicians, corresponding to 18.5 hours a week. For some physicians such as those specialized for tertiary emergency care, the limit is set at 1,860 hours, corresponding to 35.8 hours a week. The limit for trainee residents and physicians under training for special medical techniques is also set at 1,860 hours. In addition, the Occupational Safety and Health Law mandates countermeasures for physicians whose monthly overtime hours exceed 100 hours. In categorizing the overtime hours, three cutoffs were used as follows; 960 hours, 1,200 hours and 1,860 hours a year.

Clinical departments were broadly classified into five categories; (1) internal medicine departments, (2) nonsurgical specialty departments (psychiatry, pediatrics, rehabilitation and radiology), (3) surgery departments, (4) surgical specialty departments (dermatology, urology, obstetrics/gynecology, ophthalmology, otolaryngology, dentistry and anesthesiology), and (5) emergency department. The position of physicians in hospitals, except the hospital director, was categorized to (1) hospital deputy director, (2) department head, (3) senior staff, (4) house staff, (5) senior trainee resident, (6) junior trainee, and (7) fulltime nonemployee and others.

Physician work activities were classified into 3 broad categories of direct patient services, indirect patient services and nonclinical activities. Direct patient services were further classified into (1) outpatient care, (2) emergency outpatient care, (3) inpatient care, (4) working in laboratory, imaging and treatment room, (5) working in surgical operation room, and (6) conducting interviews with patient and/or family. Indirect patient services were further classified into (7) document writing for patients such as referral letters, (8) diagnostic evaluation of laboratory and image tests, (9) working with electronic medical records, (10) working on discharge summary and disease registries, (11) attending clinical conference for inpatient care, and (12) studies to prepare for inpatient care. Nonclinical activities were further classified to (13) teaching, (14) attending regular formal meeting, and (15) attending irregular informal meeting, and (16) others. In the physician questionnaire, average weekly hours spent on each work activity was obtained.

We first analyzed the contribution of time spent on different work activities to the total number of working hours on an individual physician basis. Then, we focused on the relationship between the number of patient-days per physician in each hospital and the daily number of hours spent by all physicians in the hospital to perform different work activities for one patient (“hospital-based time for one patient-day”, hereafter). Univariate regression analysis was performed to assess the association. The hospital-based time for one patient-day was calculated by dividing the average daily time spent on each work activity by all physicians, which was estimated from the physician questionnaire, by patient-days in the hospital. The number of patient-days per physician was calculated by dividing the total number of patient-days in a year by the number of physicians (1,000 physicians as a unit for convenience) in the hospital. The annual patient-days for each hospital were calculated by summing over a year the daily number of outpatients and inpatients. For the work activity “working in surgical operation room”, the annual number of patients who underwent an operation was used for patient-days.

For individual physicians, the analysis of covariance was performed with the weekly number of hours spent by a physician on each work activity as a dependent variable and the number of patient-days per physician in his/her hospital as an independent variable. Sex, age, department and position of each physician were included in the analysis of covariance model as covariates to be adjusted for. Age was dichotomized to 20–39 years of age versus others, departments were dichotomized to busy departments that included the internal medicine departments, surgery departments, and emergency department versus others, and positions were dichotomized to busy positions that included house staff physician and senior trainee resident versus others.

Statistical analyses were conducted using SAS version 9.4 [10]. The general linear model (SAS GLM procedure) was used for regression analysis and analysis of covariance [11]. The level of significance was set at 5% unless mentioned otherwise.

Results

The hospital questionnaires were sent to hospital directors of 80 hospitals in September 2018 and all directors of 80 hospitals responded. The physician questionnaires were distributed in October 2018 to 4,263 fulltime physicians of 76 hospitals (4 hospitals declined participation), and 2,353 physicians responded (response rate; 55.2%). We excluded 238 junior trainees with rotation training and 240 physicians not employed by hospitals. We further excluded 38 physicians with missing data on their working hours. A total of 1,837 physicians, 1,646 staff physicians and 191 senior trainee residents of 76 hospitals were included in the analysis. The mean and standard deviation of the number of included physicians in 76 hospitals were 51.6 and 47.0, respectively. The mean and standard deviation of annual patient-days in 76 hospitals were 127,796 and 86,200 for outpatients and 86,270 and 47,115 for inpatients, respectively. The mean and standard deviation of the annual number of patients who underwent surgical operation were 2,576 and 2,238, respectively.

The number of physicians with different annual overtime hours was tabulated in Table 1 by sex, age, department, and position. Male physicians spent a significantly greater number of overtime hours as compared to female physicians. Physicians aged 20-39 spent a significantly greater number of overtime hours as compared to older physicians. Physicians working for internal medicine departments, surgery departments and emergency department spent a significantly greater number of overtime hours than the others. Physicians of house staff position and senior trainee residents spent a significantly greater number of overtime hours than the others. When hospitals with and without emergency outpatient care were compared, there were very few physicians with overtime hours exceeding 960 hours a year in hospitals without emergency outpatient care, as shown in Table 1. Therefore, we excluded physicians in hospitals without emergency outpatient care, such as a psychiatry hospital and rehabilitation hospitals, from further analysis.

The contribution of weekly hours spent on each work activity to the total number of weekly working hours was assessed by univariate regression analysis, as shown in Table 2. Significant positive associations were observed in most work activities, except (1) outpatient care, (12) diagnostic evaluation of image and laboratory tests, (13) teaching, and (16) others. The weekly hours spent on each work activity was calculated for non-overworked physicians with an annual overtime hours of 960 hours or less and overworked physicians with an annual overtime hours exceeding 960 hours, and the difference was calculated as shown in Table 2. Overall, the sum of weekly hours for all 16 work categories was 53.0 hours for non-overworked physicians and 67.4 hours for overworked physicians, respectively. The difference was the largest for (3) inpatient care, 4.47 hours, accounting for 31.0% of total difference of 14.40 hours, followed by (5) working in surgical operation room, 1.79 hours (12.4%), (4) working in laboratory, imaging and treatment room, 1.76 hours (12.2%), and (2) emergency outpatient care, 1.74

hours (12.1%). In general, the weekly number of hours spent on direct and indirect inpatient services were greater than other work activities; 31% for (3) inpatient care, and 25% for indirect inpatient services, (8), (9), (10), and (11) combined, respectively. In contrast, the difference was negligible for nonclinical activities.

The relationship between the number of patient-days per physician and the time spent on each work activity was analyzed at both the hospital and individual level, as shown in Table 3. The time for (1) outpatient care, (12) diagnostic evaluation, and all of nonclinical activities, (13), (14), (15), and (16), were excluded because the contribution to the total working hours was negligible, as shown in Table 2. Emergency outpatient care was also excluded because the number of patients for emergency outpatient care was not available.

In eight work activities except for (5) working in surgical operation room, the hospital-based time for one patient-day showed a significant inverse association with the number of patient-days per physician. On the other hand, the weekly number of hours by an individual physician showed a significant positive relationship with the number of patient-days per physician only in (5) working in surgical operation room, and a significant inverse relationship in (10) attending clinical conference for inpatient care, and (12) studies to prepare for inpatient care.

Discussion

Overworked physicians were found to spend more hours on direct and indirect patient services, as shown in Table 2. Overworked physicians exceeding 960 hours spent 63.6 hours a week and non-overworked physicians 49.3 hours a week, respectively, on direct and indirect patient services; the excess of 14.3 hours accounting for 22.5% of the total excess. According to a report by McKinsey Center for US Health System Reform [12], the density of current practice among physicians in the United States was estimated at about 80%, and the report insisted that the density could be raised to 95%, although it is not certain if this applies to Japan as well. The question to be answered is therefore whether the excess hours worked by physicians in the present study was due to shortage of physicians or suboptimal time allocation by physicians.

According to the results shown in Table 3, the hospital-based time for one patient-day in most work activities except for working in surgical operation room was inversely associated with the number of patient-days per physician, indicating that a smaller number of physicians relative to the number of patients was associated with lesser time spent daily on one patient at the hospital level. On the other hand, the weekly number of hours spent by a physician did not show any significant association with the number of patient-days per physicians in many work activities.

The combination of an inverse association for hospital-based time for one patient-day and the lack of association for the weekly hours on an individual physician basis was observed in three out of four direct patient services; inpatient care, working in laboratory, imaging and treatment room, conducting interviews with inpatient and/or family, and three out of five indirect patient services; document writing for patients

such as referral letters, working with electronic medical records, and working on discharge summary and disease registries. This indicates that individual physicians spend a similar duration on these work activities regardless of how many patients they have to take care of, resulting in an inverse relationship at the hospital level. In hospitals with a relative shortage of physicians, the physicians tended to spend lesser time for one patient-day on these work activities. In hospitals with a relative surplus of physicians, the physicians tended to spend more time, presumably more than necessary on some occasions, on these work activities. This situation is schematically illustrated in Figure 1, where the oval represents the distribution of hospitals and the transverse line represents the appropriate amount of time to be spent for one patient-day. The area above the appropriate level line indicates that a proportion of time spent for one patient-day is more than necessary due to a relative surplus of physicians, whereas the area under the appropriate level line indicates that hospitals suffer from a relative shortage of physicians. It is not possible, however, to determine the appropriate amount of time to be spent for one patient-day in the present study as it depends on many factors such as patient's status, severity of disease, time required to perform interventions if needed, and acute versus post-acute phase.

For direct patient services except for working in surgical operation room, improvement in efficiency of practice seems to be promising. The waiting time between two consecutive patient services can be reduced by more efficient scheduling in daily practice without affecting the quality of service [12]. Shifting certain clinical tasks which can be performed by trained health professionals other than physicians also seems promising [13].

According to Table 2, weekly hours spent on document writing for patients such as referral letters, working with electronic medical records, and working on discharge summary and disease registries accounts for 13.3% of the total weekly hours. These work activities are thus important targets to reduce the number of overtime hours. The time could be reduced by shifting part of these activities to other health professionals and clericals [13]. Since working on the computer for documentation, electronic medical records and other activities is a risk factor for physician burnout [14] independent of the total workload, reduction of time without improving task efficiency may lead to an increased risk of burnout. New information technologies such as AI-supported input auxiliary, for example, must be considered [15].

With regard to working in the surgical operation room, the weekly number of hours spent by individual surgeons was found to be positively associated with the number of surgically operated patients, while at the hospital level, the time spent on one surgically operated patient was not associated with the number of operated patients. This probably reflects the fact that the time spent on one surgically operated patient is not as flexible as other direct patient services.

With regard to work activities such as attending conference for inpatient care and studies to prepare for inpatient care, both hospital-based time and the time at the individual physician level showed an inverse association with the number of patient-days per physician. Supposedly, these activities are more likely to be sacrificed in situations where there is an increased patient load in the hospital. Physicians need an extended period of time to attend clinical conferences for inpatient care and studies to prepare for

inpatient care, especially when the scheduled diagnosis or treatment method is unfamiliar to them. More time is needed to discuss matters in clinical conferences and to study research articles and clinical practice guidelines beforehand. Time spent on such activities could be reduced nationwide by encouraging specialists to provide trustworthy clinical practice guidelines [16]. Such information will improve the quality of care by providing more efficient ways to discuss and study the most appropriate methods of care.

The number of patient-days per physician in a hospital has a direct impact on physician workload. A straightforward countermeasure seems to be to increase the number of physicians or to decrease the number of patients in the hospital. Caution should be exercised, however. Since the time for one patient-day is inversely associated with the number of patient-days per physician, efforts to reduce patient-days per physician might lead to a lower efficiency, and the overtime hours may not decrease as expected. More importantly, the time required to perform work activities should be reduced first, followed by reducing the number of patient-days per physician in order to effectively reduce the number of overtime hours.

The present study covers 76 hospitals of various sizes from different locations throughout Japan. Although the response rate of the physician survey was not high (55.2%), the results of the present study are able to reflect the current situation of overworked physicians in Japan. The healthcare system differs in each country, and so does the intricacies of physician practices. Since physician burnout has become a global issue, the results of the present study can hopefully shed some insight on how to approach this problem in other countries.

Several limitations of this study should be mentioned. First, detailed information of patients treated in these hospitals was not available; the distribution of disease and interventions in participating hospitals had to be considered as residual confounders. Another limitation is that the data analyzed in this study were collected by self-administered questionnaires. To increase the quality of this study, a longitudinal study design would be preferred with detailed baseline information of patient characteristics and follow-up information of each physician's work activities made available. As the next step, the results of the present study will be made available to all Saiseikai hospitals, and physician working hours will be studied using a series of follow-up surveys henceforth.

Conclusion

Physician overwork was found to be associated with an increased amount of time spent on direct and indirect patient services, especially inpatient services. Physicians tended to spend more time on each patient in hospitals with a smaller number of patients to be taken care of by a physician. In these hospitals, improvement in the efficiency of care is promising, and this could be achieved by reducing the waiting time between services, for example. Indirect patient services such as document writing, working with electronic medical records, and working on discharge summary and disease registries can be made

more efficient by introducing new information technologies or by shifting part of these activities to other health professionals and clericals.

Abbreviations

Saiseikai

The Saiseikai Imperial Gift Foundation, Inc.

Declarations

Ethics approval and consent to participate

The study was approved by the Ethics Committee of Saiseikai Research Institute of Health Care and Welfare (Research Institute, hereafter). The members of Ethics Committee are Yoshiharu Aizawa (chairperson), Kensaku Ohashi, Yuzuru Tajima, Nobuhiro Tsukada, and Masao Morita. The Ethics Committee is an independent committee under the Research Institute, and none of members belongs to the Research Institute.

The informed consent by respondents was waived by the Ethics Committee, based on the following judgments:

The hospital questionnaire is responded by the hospital director and personnel charged in administration and management of hospital, not intended to collect personal issues of respondent.

The physician questionnaire is anonymously and voluntarily responded by physician, who is invited but not forced to respond the questionnaire.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

NY, YM, SM, and SS developed the study protocol and questionnaires.

NY and YM collected data from participating hospitals.

NY analyzed data and wrote the manuscript draft.

YM, SM and SS reviewed the manuscript draft.

All authors have read and approved the manuscript. The declaration of contribution and approval of manuscript with signature of all authors was attached.

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Tables

Due to technical limitations, Tables 1-3 are provided in the Supplementary Files section.

Figures

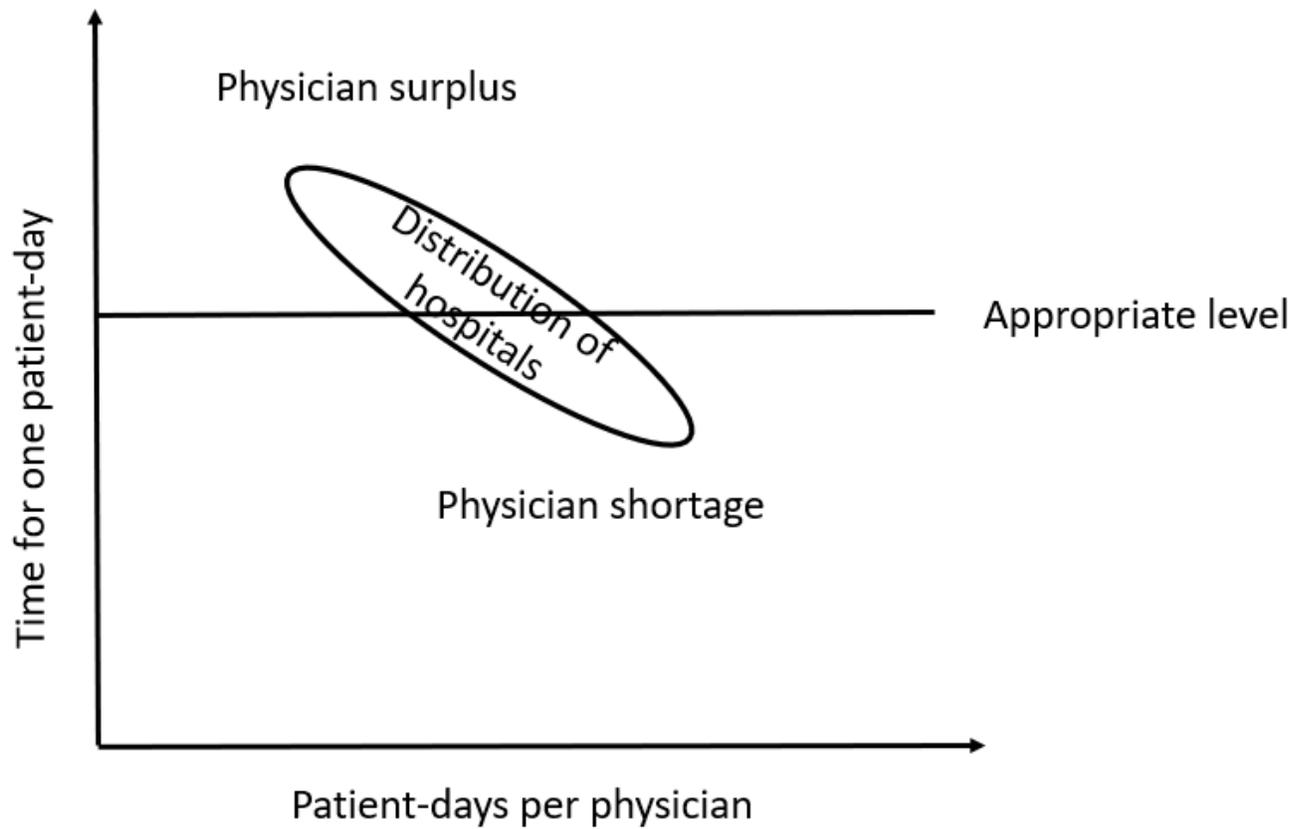


Figure 1

Schematic illustration of time for one patient-day and patient-days per physician in hospitals.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Tables.docx](#)