

The Association between Chinese Doctor's Workload and Medical Disputes

Weixian Xu¹, Jingcheng Xie², Hubing Wu³, Zhiguo Guo⁴, Lijun Guo¹ and Xinheng Feng^{1*}

¹Department of Cardiology, Peking University Third Hospital and Key Laboratory of Molecular Cardiovascular Science, Ministry of Education, Beijing, 100191, China

²Medical Administration Division, Peking University Third Hospital, Beijing, 100191, China

³Department of Management of Medical Records, Peking University Third Hospital, Beijing, 100191, China

⁴Department of Emergency, Peking University Third Hospital, Beijing, 100191, China

Abstract

Objective: There is a surge of hospital violence against doctors in China. We aimed to investigate the changing trend of the doctors' workload in China, and the associations between the doctors' workload and the medical disputes.

Methods: The data was collected in a tertiary teaching hospital located in Beijing from 2001 to 2012, including the parameters of clinical work and research work of the doctors, as well as the number of the medical lawsuits.

Results: The number of patients and surgeries significantly increased. The number of doctors increased with a lower annual growth rate, leading to the doctor's increasing workload. The papers published by the doctors and the research projects also increased. The medical lawsuits dramatically increased from 36 cases in 2006 to 65 cases in 2012. The number of inpatient per doctor (IPPD) was positively related to the number of lawsuits. After adjustment for the confounders, such as average hospitalization expenses and in hospital death, the logarithmic transform of IPPD was significantly positively associated with the number of lawsuits.

Conclusions: The Chinese doctor's workload is on rapid rise. The increasing workload was associated with medical disputes. Interventions aimed at reducing doctor's workload are necessary.

Keywords: Doctor; Workload; Hospital violence; Medical dispute

Background

Violence by patients against doctors is on the rise in China. A recent surge in deaths among healthcare workers in China has become a huge concern. Over the 10 years to the end of 2011, there were 124 reported incidents of serious violence in hospitals, including 29 murders and 52 serious injuries. There were six reported stabbings of doctors by patients in China in the past October 2013 alone. According to a survey by the Chinese Hospital Association from December 2012 to July 2013, violence against medical staff is on the rise. The annual average number of assaults on doctors per hospital increased from 20.6 in 2008 to 27.3 in 2012, after polling staff and patients at 316 hospitals in more than 30 provinces. 96% of medical staff have been abused or injured in 2012 [1]. The Chinese doctors are under threat of violence [2-5]. There are many possible reasons for the surge, such as poor treatment, expensive fees, a deficit of trust, poor public understanding of medicine, unrealistic patient expectations about treatments, and media reports distorting the situation. Among these reasons, perhaps a very important reason is the poor investment in the health care system and in training and paying doctors leading to a doctors' excessive workload.

The previous studies show that high workload is one of the most frequent sources of doctor's stress, and that high workload is associated with high levels of work-related psychiatric morbidity and burnout [6-9], as well as physical health [10-12]. High workload also affected the doctor's medical practice which can lead to medical errors, corruption, and poor communication between health professionals and patients [13-16]. For example, high workload often inhibits physicians from meeting patients' needs, and patients perceives themselves as receiving less support from physicians when treated in hospitals where physicians reported working more overtime hours and having less time for patient care [17]. With the development of Chinese medical reform in 1990s, hospitals have to change their roles from public service to business because of the increased commercialization of medicine and reduced investment from government. Furthermore, the ratio of doctors to patients is relatively low in china. In 2010, China had 1.4 physicians per

1,000 citizens; the U.S. had 2.7, Australia 3.9. The workload of doctors in China has been dramatically increased. Little is known about the doctor's workload in China. In the previous studies, workload was mostly evaluated by work hours or subjective questionnaires [8,9,11,18-20]. However, work hours do not definitely represent work intensity, and to define the workload by working hours may be inappropriate for some departments. Objective data of doctor's workload are very limited. In this study, we aimed to investigate the changing trend of the Chinese doctors' workloads which were assessed by the objective parameters indicating the clinical work and research work of the hospital development, and the associations between workloads and medical disputes.

Methods

Study design

Retrospective study.

Data resource

The data was collected from Medical Administration Division, Human Resources Department and Research Department in a tertiary teaching hospital located in Beijing, from 2001 to 2012. The study was approved by the Peking University Third Hospital institutional review board. The written informed consent was not obtained because this was

***Corresponding author:** Xinheng Feng, Department of Cardiology, Peking University Third Hospital, No 49 North Garden Road, Haidian District, Beijing, 100191, China, Tel: +8610-82264492; E-mail: fxh4492@163.com

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a retrospective study in which all the data were anonymous and de-identified prior to analysis. The doctors here are usually responsible for clinical work as well as teaching, research, and administrative tasks. We focus on the parameters of clinical work and research work. The clinical work parameters included the numbers of patient visits (outpatients, inpatients, emergency patients), surgeries, mortality of inpatients, average stay days in hospitals (ASDH), average hospitalization expenses (AHE), and the number of doctors, especially as well as the daily patient per doctor (DPPD), outpatient per doctor (OPPD), inpatient per doctor (IPPD) which were better parameters reflected the doctors' workloads. The research workloads were indicated by the number of published papers and the projects for national natural science foundation of China (NNSFC). On the other hand, the data of the medical dispute cases indicated by medical lawsuits in the hospital were also collected. Because there were no details about medical lawsuits before 2006y, we had to collect only the information of lawsuits from 2006y to 2012y.

Definition and formula of the parameters

- (1) Numbers of doctors: the number of register doctors on 1st January of each year.
- (2) Number of patient visits: the number of visits including outpatients from outpatient departments and emergency room.
- (3) Number of inpatients: the number of inpatients.
- (4) Mortality of inpatients = (deceased inpatients/all inpatients)*100%
- (5) Average stay days in hospitals (ASDH)= total occupied bed days of discharged patients/discharged patients.
- (6) Daily patient per doctor (DPPD) = (the number of visits/ number of doctors)/251
- (7) outpatient per doctor (OPPD) = the number of outpatients/ number of doctors
- (8) inpatient per doctor (IPPD) = the number of inpatients/ number of doctors
- (9) The number of medical lawsuits: the number of medical lawsuits which were established in the law courts.

Explanation about the SCI, CMCI

SCI means Science Citation Index which is a citation index originally produced by the Institute for Scientific Information (ISI) and created by Eugene Garfield, covering the world's leading journals of science and technology. CMCI means Chinese Medical Citation Index which is a database including many significant Chinese journals about medicine. The number of papers cited by SCI or CMCI partly reflect the research ability of a unit.

Statistics

The time was divided into three phases: Phase I (2001-2004), Phase II (2005-2008), and Phase III (2009-2012). The parameters were expressed as mean \pm SD. ANOVA test or t-test were conducted to compare the differences between groups. The association between workloads and medical lawsuits was explored by Pearson correlation and multiple linear regression. The annual growth rate (AGR) was used to represent the trend of change. The calculating formulas of them are as follows: $\bar{G} = \sqrt[n]{\frac{Y_1}{Y_0} \times \frac{Y_2}{Y_1} \times \dots \times \frac{Y_n}{Y_{n-1}}} - 1 = \sqrt[n]{\frac{Y_n}{Y_0}} - 1$ (n means the number of total years evaluated, Y_0 means the value at 2001 year). All tests were two-tailed and a value of $p < 0.05$ was considered statistically significant. Statistical

analysis was performed using SPSS 19.0 for Windows.

Results

The trend of parameters for clinical work

From Phase I to Phase III, the number of patient visits increased from $144.78 \pm 10.81(X10^4)$, ten thousand) to $288.93 \pm 47.17(X10^4)$, with the AGR of 7.80%. The number of inpatients increased by more than two times from $2.71 \pm 0.48(X10^4)$ to $6.37 \pm 0.81(X10^4)$, with the AGR was 10.01%. The increase in trend was similar in the number of surgeries. The number in Phase III was all significantly higher than that of Phase I and Phase II (all $p < 0.001$). The average hospitalization expenses per inpatients increased too ($p = 0.003$). While the mortality of inpatients significantly decreased from 1.22% to 0.53%, and the average stay days in hospital also significantly declined from 12.65 days to 6.99 days (all $p < 0.001$). Although the number of doctors increased from 488.75 ± 37.32 to 694.50 ± 20.44 over the 12 years, the AGR was 4.23%, which was far lower than that of the patient volume. The daily visits per doctor (DPPD) increased from 11.85 to 16.53 patients with an AGR of 3.22%. The outpatient per doctor (OPPD) increased from 2687 to 3796; and inpatient per doctor (IPPD) increased from 55.33 to 91.56 (all $p < 0.001$). The detailed data was shown on Table 1 and Figure 1.

The change in trend of parameters of research work

Both the number of projects applying for NNSFC and that of NNSFC funded were significantly on the rise with AGR of 11.18% and 12.63% respectively. The papers cited in SCI database and in CMCI database also significantly increased with AGR of 25.85% and 6.19% respectively. The data was shown on Table 1.

The change in trend of medical lawsuits

The medical lawsuits dramatically increased from 35 in 2006y to 65 cases in 2012y with the AGR of 8.81%. The cases were significantly higher in phase III than Phase II ($p = 0.009$). The data was shown on Figure 1.

The association between doctor's workload and medical lawsuits

Table 2 shows the correlations between lawsuits and the logarithmic transform of different variables. The lawsuits were positively related to the DPPD, OPPD, and IPPD ($r = 0.911, 0.908, 0.983$ respectively). The correlations between lawsuits and research workloads were not as strong as the clinical workloads. In the linear regression model, logarithmic transform of IPPD was independently associated with lawsuits (beta = 0.893, $p = 0.002$), after adjustment for in hospital death and average hospitalization expenses.

Discussion

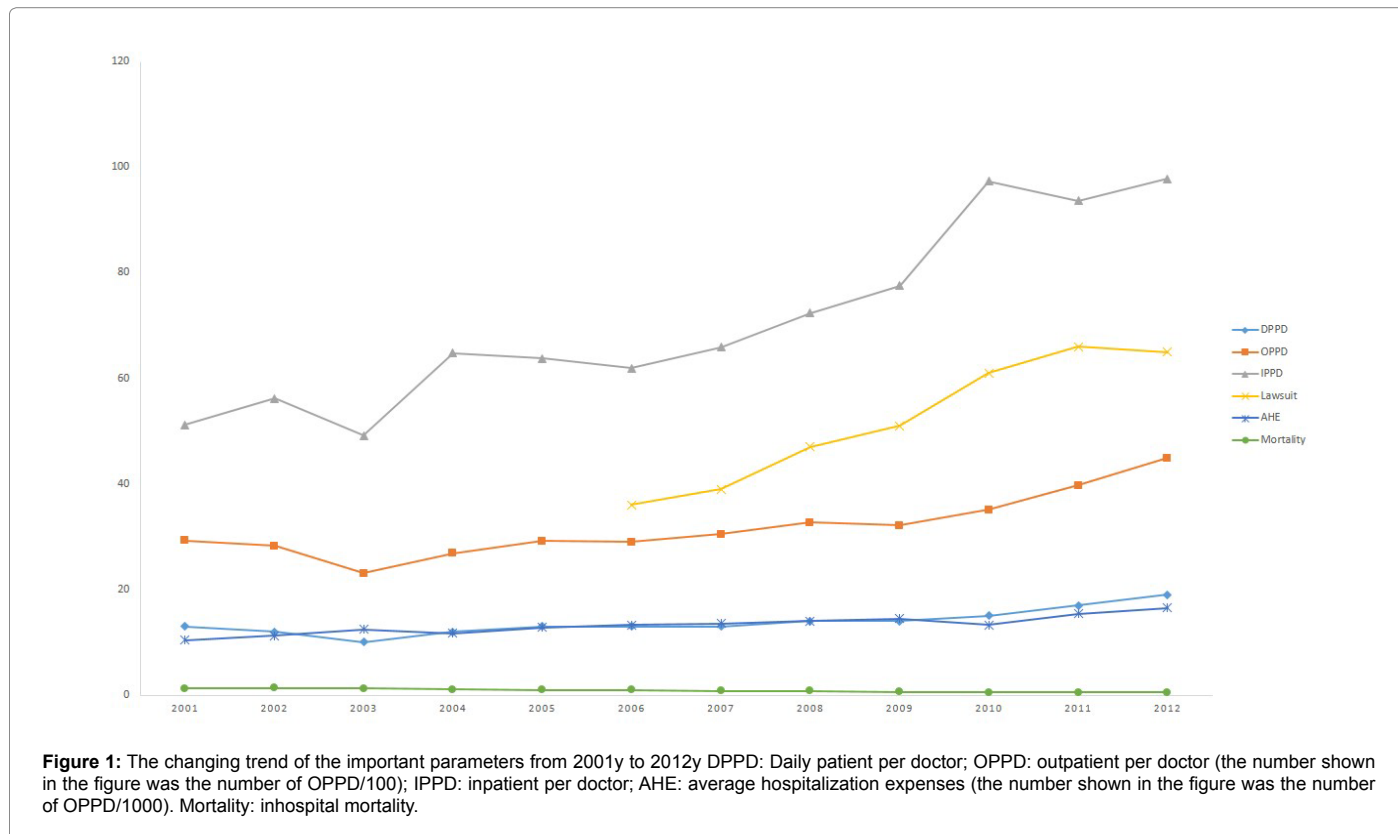
Both patients and surgeries dramatically increased. Though doctors also increased, the AGR was lower than that of patients and surgeries. Therefore, the objective doctor's workload parameter, such as DPPD, OPPD and IPPD, significantly increased. The lawsuits were positively related to the DPPD, OPPD, and IPPD. After adjustment for confounders, logarithmic transform of IPPD was independently associated with lawsuits.

To our best knowledge, this is the first study to assess the workload of doctors in China by the objective parameters of hospital development. There are several studies investigating the workload of doctors. Most of them assessed workload by questionnaires in which work hours or the feeling of workload were asked [8,9,11,18-20]. The work hours varied

Variables	Phase I (2001-2004)	Phase II (2005-2008)	Phase III (2009-2012)	P value	AGR(%)
Visits(X10 ⁴)	144.78 ± 10.81	203.19 ± 22.88	288.93 ± 47.17	<0.001	7.80
Outpatients(X10 ⁴)	130.76 ± 9.62	184.51 ± 20.53	264.43 ± 46.27	<0.001	8.00
EM Patients(X10 ⁴)	14.02 ± 1.21	18.67 ± 2.36	24.50 ± 2.40	<0.001	5.72
Inpatients(X10 ⁴)	2.71 ± 0.48	4.01 ± 0.48	6.37 ± 0.81	<0.001	10.01
surgeries(X10 ⁴)	1.46 ± 0.32	2.52 ± 0.41	3.69 ± 0.54	<0.001	12.22
Mortality(%)	1.22 ± 0.11	0.88 ± 0.10	0.53 ± 0.05	<0.001	-7.00
ASDH	12.65 ± 0.99	10.01 ± 1.00	6.99 ± 0.62	<0.001	-5.82
AHE (X10 ³)	11.58 ± 0.86	13.44 ± 0.51	14.94 ± 1.38	0.003	3.90
Doctors	488.75 ± 37.32	606.75 ± 38.60	694.50 ± 20.44	<0.001	4.23
DPPD	11.85 ± 1.21	13.32 ± 0.78	16.53 ± 2.22	0.006	3.22
OPPD	2686.56 ± 269.86	3035.27 ± 172.86	3795.88 ± 556.00	0.006	3.62
IPPD	55.33 ± 6.96	65.96 ± 4.57	91.56 ± 9.53	<0.001	5.55
CMCI paper	447.50 ± 78.59	683.50 ± 77.52	727.33 ± 25.58	0.001	6.19
SCI paper	23.00 ± 13.78	57.25 ± 21.64	142.00 ± 25.24	<0.001	25.85
Projects for NNSFC	49.75 ± 8.50	97.75 ± 5.32	122.33 ± 20.4	<0.001	11.18
Projects of NNSFC funded	13.00 ± 2.94	17.00 ± 1.83	29.67 ± 11.02	0.016	12.63
Lawsuits		40.67 ± 5.69	60.75 ± 6.85	0.009	8.81

X10⁴: ten thousand; AGR: Annual growth rate; EM: emergency; ASDH: Average stay days in hospitals, AHE: average hospitalization expenses, DPPD: Daily patient per doctor; OPPD: outpatient per doctor; IPPD: inpatient per doctor; CMCI: Chinese Medical Citation Index; SCI: Science Citation Index; NNSFC: national natural science foundation of China.

Table 1: The changing trend for parameters of clinical and research work from 2001 to 2012.



Variables (logarithmic transform)	DPPD	OPPD	IPPD	SCI	CMCI	Funded	Mortality	AHE
relative coefficient	0.911	0.908	0.983	0.871	0.262	0.865	-.979	0.704
P value	0.004	0.005	<0.001	0.024	0.616	0.026	<0.001	0.077

DPPD: Daily patient per doctor; OPPD: outpatient per doctor; IPPD: inpatient per doctor; SCI: Science Citation Index; CMCI: Chinese Medical Citation Index; Funded: project of funded by national natural science foundation of China; Mortality: in-hospital mortality; AHE: average hospitalization expenses.

Table 2: The correlations between doctor's workload and medical lawsuits.

in different surveys. A survey of 1,219 primary care/family physicians conducted in Ontario of Canada in 2007, showed that female physicians spent 35 hours per week caring for patients, male physicians' 42.9 hours per week [21]. In surveys of work hours in Norway, researchers have shown that physicians work an average of 52.8 hours per week [22], and physicians from the United States work 53.9 hours per week [23]. While in a study of Taiwan, physicians work an average of 65.6 hours per week [24]. In our study, we showed the doctor's workload by hospital patient volume, which is an objective data rather than subjective perception or survey. We could not compare our study with the above studies directly because of the different parameters. But we can see the workload of Taiwan is much higher than that of abroad. The situation in China mainland would be more severe than in Taiwan due to more shortage of medical resources. For example, Health Personnel Per 1000 Population in Taiwan in 2009 is 10.1, while it is 2.8 in China mainland [25]. Just as the above studies, the workload in different hospitals greatly varies in China. According to the China Health Statistical Yearbook 2012 [25], the DPPD in tertiary hospital, second-level hospital, primary hospital in 2011 is 7.9, 6.5, and 6.4 respectively. However, the number in our hospital is 12.94 in 2001, and increased to 19.39 in 2012, which is far higher than the average level all over China. From the other side, the average days in hospitals in our hospital decreased from 13.60 days to 6.62 days. The average number of days in hospital is 12.0 in all tertiary hospitals in 2011. Because of the pressure of the imbalance of very limited beds and so many inpatients, the doctors have to spend more time and care on patients in order for the patients to be treated timely, successfully and be discharged as soon as possible. As every physician knows, at the time of patient admission or discharge, the workload is higher for doctors. Reduction of the average day in hospital maybe reduces the cost spent on patients, but unfortunately increases workload. Therefore, IPPD was better parameter of doctors' workload, and it was an important predictor of medical lawsuits.

The average stay days in hospitals and the in-hospital mortality significantly declined. The doctors are the contributors to hospital advancements as they devote their life to medical service by long-term heavy workload. In major hospitals, doctors are usually responsible for clinical work as well as teaching, research, and administrative tasks. The pressure of research, such as applying for funding and writing papers, is increasing year after year. The results of research are usually important factors affecting the promotions. Unfortunately, the doctors have to do the research after they have finished heavy clinical work. The extra research work further aggravates the workload which is already very heavy. In a recent Ministry of Health report, about 80% of doctors in secondary and tertiary facilities describe themselves as overworked and underpaid. 39.8% staff planned to give up medical profession or switch to other profession [1].

The long-term excessive workload not only results in psychological problem, such as anxiety, depression, burnout, insomnia, unhealthy life style, and even physical diseases [7,10,11,15], but also impact patient-physician interaction. In Ansmann Lena's study [17], the patients feel less supported by their physicians when the hospital's overall physician workload is high, and physician support perceived by patients was

related to the hospital's average number of physician overtime hours per month and to the physicians' perceived lack of time for patient care. The excessive workload make doctors fail to communicate with patients actively due to the work-related psychological disorders or dissatisfaction about their jobs, and fail to communicate enough due to time pressure. The poor communications lead to the misunderstanding of patients, and even medical disputes and hospital violence. There is a surge of hospital violence in China these recent years. The doctors are under the crisis of violence. In our study, the doctor's workload IPPD was an independent predictor for the medical dispute cases. Although the reasons for the violence against doctors are complicated, it is reported that a large part of medical disputes in China were secondary to poor communication between doctors and patients [1]. Communication plays extremely important roles during the medical service, especially under the conditions that most of patients in China have poor public understanding of medicine, and unrealistic patient expectations about treatments. This is a way to ease the growing tensions between doctors and patients by enhancing communications. But the premise is that the workload of doctors can be reduced. Therefore, reducing workload may be essential for the resolution of medical disputes and hospital violence in China. China's health-system reforms cannot be successful without reforming the social and economic status of doctors. The doctors should not be the victims of hospital violence. China needs to make medicine an attractive, respected, rewarding, and safe profession again, to protect the doctors of today and those of tomorrow, for the benefit of patients.

Not only is interaction between patients and doctors affected, excessive workload may affect the doctors' medical practice itself. Recently, Henry Michtalik and colleagues [13] conducted a study to investigate the effects of attending physician workload on patient safety. Among the 506 responders, 40% reported that their census reached unsafe levels at least once monthly, and one third of respondents reported a frequency of at least once weekly. Hospitalists reported that increased workload led to unnecessary testing, delayed admission or discharge, and inability to discuss treatment options fully with patients and family members, and that their workload worsened quality of hand-offs and patient satisfaction. All these data highlight that excessive workload damages not only the benefits of doctors, but also the benefits of patients.

There are some limits in our study. Firstly, details of working hours and job intensity were unavailable in this study. In fact, the working hours and intensity vary every day, and there are different working-rest pattern in different departments. Furthermore, the working intensity is also very difficult to assess. Therefore, we used the hospital parameters to indirectly reflect the doctor's workload. Secondly, data related to ASDH, AHE, DPPD, OPPD, IPPD was collected in 2001-2012. But data about medical disputes only referred to 2006-2012. These inconsistent 2 timeframes may affect the results of the study. Because the medical disputes was not unusual before 2005, the specific department for medical disputes was not established until late 2005 in the hospital. We couldn't exactly collect the data of medical disputes before 2005. At last, another point should be addressed here. The "violence incidents" may not absolutely develop "medical disputes" in health care workplaces.

Here we only explored the association between workload and medical dispute which was formally recorded in the hospital, however we didn't have the exact data of violence incidents.

Conclusions

In summary, the doctor's workload is on the rise. The workload is related to medical lawsuits. The excessive high workload leading to less patient interaction and possible unsafe practice, may be an important factor in the surge of hospital violence in China. Interventions aimed at reducing doctor's workload may be a good way to ease the worsening interactions between patients and doctors. It is not only beneficial to doctors themselves, but also beneficial to patients because doctors can spend more time providing better care. The findings of this study are useful for policy makers, managers and providers interested in organizational development, human resource management. In order to achieve long-term better development of medicine and better outcome of treatment, it is crucial to improve the doctor's quality at the profession level, psychological health and physical health. The medical reform won't be successful without the improvement of doctors' situation in China. The doctors should be the contributors to medicine development rather than the victims of high workload due to the present medical policy in China.

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