



# Overwork Death of Chinese Physicians under High-Intensity Pressure, 2007-2018

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## Abstract

**Background:** To summarize the cases of physicians overwork death between Jan 2007 and Dec 2018, the tragedy merits the attention of the authorities and policy-makers to increase their efforts to reduce death among physicians in China.

**Methods:** Data were extracted from medical databases, local mass media, official documents and medical Bulletin Board System (BBS), in which only included articles, reports and news listed in the retrieval strategy, and unpublished data were excluded.

**Results:** Overall, 110 cases (7 females and 103 males) were enrolled in this study. Most incidents have occurred since 2012, especially in 2017. Of these, 86 (78.18%) physicians worked in public tertiary hospitals, four times more than the number of cases taking place in secondary hospitals. Additionally, overwork death was the most common in surgery-related departments that account for up to 65 (59.1%). Notably, these events, taking place in first-tier cities and the southeastern coastal areas of China, included 27 chief physicians, 31 associate of chief physicians, 21 attending physicians, 10 resident physicians and 4 standardized training physicians.

**Conclusion:** Overwork death among Chinese physicians is not only a contemporary health problem but also a critical social issue. The laws and regulations should be perfected to prevent the events. Meanwhile, the public should be aware of the need for more understanding and trust in physicians in China.

**Keywords:** Overwork death; Physician death; China

## Introduction

Overwork death is defined as an abrupt and unexpected death at working continuously, non-violent and not otherwise explained, occurring within 24 h of the onset of symptoms. In China, modern hospital management began with China's reform and opening up policy. With more than 30 years of developments, the medical level of some tertiary hospitals has kept pace with the world. However, physicians' workloads have in-

creased dramatically (1,2). In recent years, overwork death among physician has become a more serious problem challenging medical education and hospital management (3).

This study reviewed the events to describe their characteristics, to call for action to prevent tragedies from happening, and hoped that physicians should pay more attention to their own lives and be kind to themselves.

## Methods

Data were extracted from medical databases, local mass media, official documents and medical Bulletin Board System (BBS), such as Cochrane Library, PubMed, Web of Science, CHKI, Wanfang, Google Scholar, Baidu and www.dxy.cn (a popular medical web in China) between Jan 2007 and Dec 2018, using the search terms "physicians", "physicians", "suddendead", "overwork-death", "karoshi" (occupationally-related sudden death) (4) and "China". Physicians who have an abrupt and unexpected death at working continuously, non-violent and not otherwise explained, occurring within 24 h of the onset of symptoms in the articles, reports and news were enrolled in the study. Unpublished data were excluded from this study. Overwork death with relatively complete data description, including the time of death, gender, age, medical title, department, province, levels of hospital, hospital name, cause of the death were screened. All data were expressed as the number and percentage.

Data analyses were performed using SPSS 22.0 software (SPSS Inc., Chicago, IL, USA) or GraphPad Prism 7.0 (GraphPad Software, LaJolla, CA, USA).

## Results

From 2007 to 2018, 110 cases of overwork death in Chinese physicians were enrolled in this study. The number of these is described in (Fig. 1 a). Notably, a majority of cases have occurred since 2012, especially in 2017. Thirty-four physicians were died in that year, which was more than twice the number in 2016 and three times that in 2018. The proportion of men overwork death was higher more than fourteen times compared to women (93.64% vs 6.36%). The mean ages of men and women were  $41.74 \pm 8.75$  yr (ranging from 25 to 61 yr) and  $34.71 \pm 8.83$  yr (ranging from 26 to 50 yr), respectively. Women are significantly younger than that of men ( $P < .05$ , Fig.1 b). Importantly, most cases occurred aged 34-48

years.

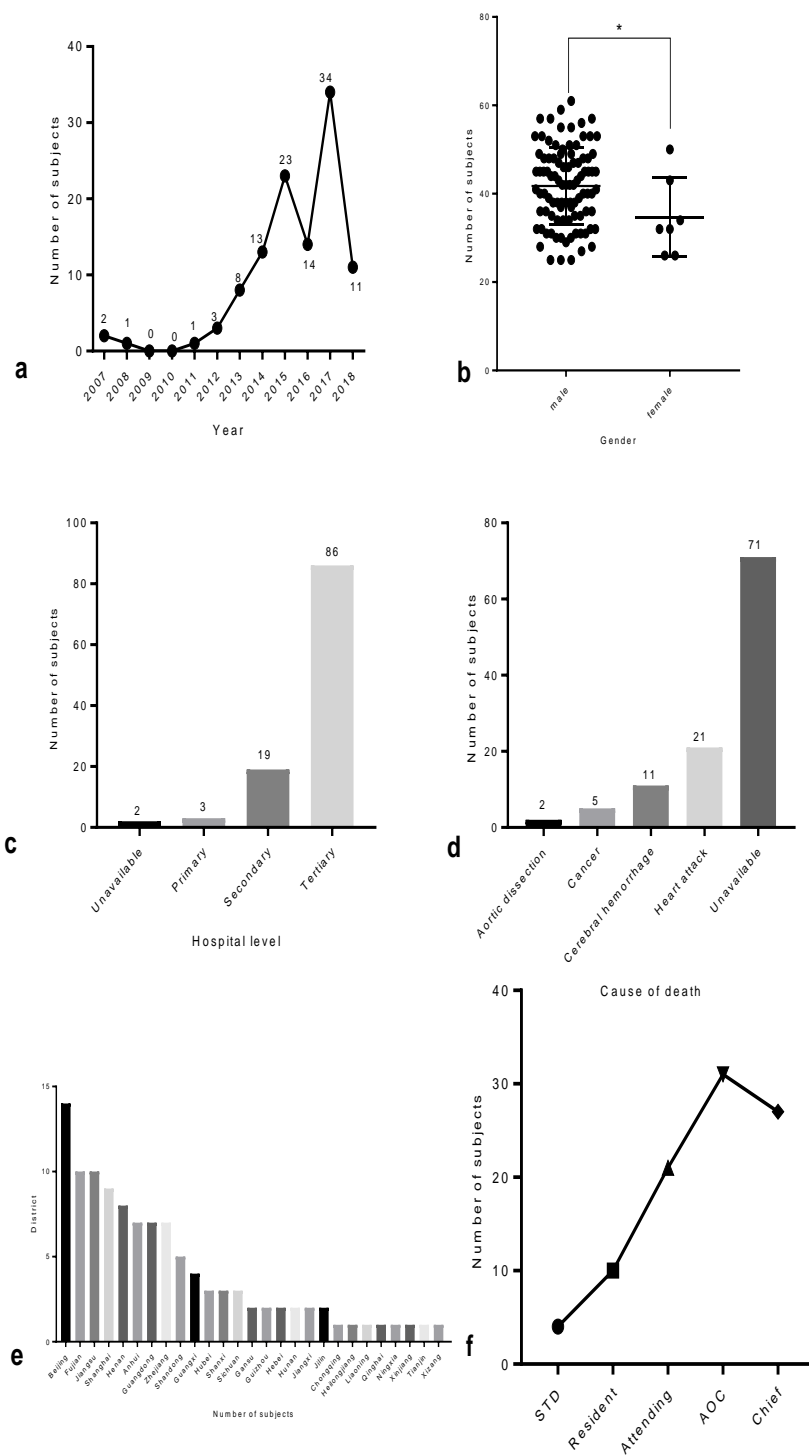
According to hospital scale grades, in China, we have classified into primary, second and tertiary. Of these, 86 (78.18%) physicians worked in public tertiary hospitals, four times more than the cases ( $n = 19$ ) taking place in secondary hospitals (Fig.1 c). Further analysis showed that the causes were heart attack 21(19.09%), cerebral hemorrhage 11(10%), cancer 5(4.56%), aortic dissection 2(1.82%). However, the cause was unavailable in 71 cases (64.60%) (Fig.1 d).

Overwork death was reported to be involved in various departments. Of them, the highest occurrence rate was found in the department of anesthesiology 22(20%), followed by orthopedics 20 (18.18%). Regional analysis showed that the physicians overwork death was most prevalent in first-tier cities and the southeastern coastal areas of China. Beijing accounted for up to 14(12.73%), followed by Jiangsu (9.09%), Fujian (9.09%) and Shanghai (8.18%). Unexpectedly, 110 cases included 27 chief physicians, 31 associate chief physicians, 21 attending physicians, 10 resident physicians and 4 standardized training physicians (STD) (Fig.1 f). The proportion appears to be positively related to the title of the physician.

## Discussion

Few studies have been performed on the issue of overwork death among physicians in mainland China. In this review, we summarize 110 events from 2007 to 2018. The overwork death was particularly high for male, age in the 34-48 yr, servicing in the department of anesthesiology in first-tier cities.

Female physicians may also be under more pressure besides working pressure, such as housework, caring for the elderly and children. Combined with high workload, they may be more exhausted and possibly have more overworked death than male (5).



**Fig. 1:** a) The number of doctors who were die due to sudden death from 2007 to 2018. b) age distribution of sudden death doctors. c) The distribution of hospital of affected doctors. d) The cause of sudden death of affected doctors. e) The distribution of district about sudden death doctors. f) The distribution of medical titles about sudden death doctors

However, in this series, the number of men to death has fifteen times higher than that in women. On the one hand, male physicians suffer more financial, social and family pressure, especially those aged 34-48. On the other hand, they neglect their health. Unhealthy lifestyles such as excessive alcohol consumption, smoking, and long-term drink carbonated beverage are another important reason for this phenomenon.

Overwork death was the highest in the anesthetist, which was also in accordance with the study of Zhang HF et al (6). Physicians in this group might undergo more work stress. From 1998–2016, the number of physicians in China increased by 60% (from 2.0–3.2 million). However, the number of visits attended by physicians and the number of inpatient increased, by 276% and 355%, respectively. Thus, patient visits per physician increased by 135% and inpatient admissions per physician rose by 184% during this period (5). Additionally, resources of physicians, especially anesthesiologists, are limited. From the beginning of 2005 to the end of 2014, China produced 4,727,977 clinical medical graduates. However, during this period, there was an increase of only 752 233 (15.91%) in the total number of clinical physicians registered in practice. Using demographic data from this 10-year period, they found that the proportion of physicians aged 25–34 yr had decreased from 31.3% to 22.6%, and the proportion of physicians aged 60 yr and older had increased from 2.5% to 11.6%. Rural areas had a shortfall of over 500 000 physician (7). The reason for that is the imbalance between supply and demand caused by the intense study career and low income in medical colleges. In China, it takes a "5 + 3" model to become a qualified physician (5-year medical education programme plus 3-year standardized training for resident physicians). If you get the doctorate, the time will be extended for another 6 years. Overlong study time and low subsidy make more students turn away from medicine, which results in the decline of enrollment in medical colleges and universities in China annually. The imbalance has

forced many medical staff to work overtime, and numerous cities suffering from "physician shortage". Worse, 45% of physicians in China are not prepared for their children to become a doctor (8).

Notably, the first-tier cities and the southeastern coastal areas are well developed in China, where have gathered the best experts and medical equipment. Patients who suffered from incurable diseases tended to seek better medical care. Meanwhile, Chinese physicians who worked in well-developed tertiary hospitals also have pressure of getting promotion. Scientific research is not a luxury, but a necessity for enjoyment, however many hospitals have brought the number and quality of articles published and the research implemented by physicians into their promotion mechanisms (9). Physicians have to spend their rest time doing scientific research, which seriously increases the working load. In this study, the majority of physicians who succumbed to overwork death worked tertiary hospitals. However, primary hospitals had even fewer incidents. Additionally, the intensification of physician-patient contradiction has made many people reluctant to medicine. From 2003 to 2013, there were 101 incidents of serious medical violence, and 24 deaths among physicians and nurses were reported. Even today, Chinese medical staffs still have been facing the risk of harm at work (10). These heavy physical and psychological burdens potentially contribute to the increasing overwork death of physicians in China (11).

Several limitations need to be noticed. First, the study was a brief summary of the relevant reports retrospectively, in which is difficult to determine the number of overwork death accurately. Secondly, disease caused overwork death (64.60%) was unknown. There is no actual reported information about an individual's work-hour on the most reports. Finally, the purpose of this study was to improve the awareness of physicians for self-alert, self-protection, and self-life-saving (12). Therefore, there was not further analysis of the data.

## Conclusion

Deteriorated working environment, serious violence against physicians, and decreased patient–physician trust also intensified the sense of “burnout” in Chinese physicians (13). Overwork death among physicians is common in China, which may only report the tip of the iceberg in this study. The Chinese government has promulgated a series of laws and regulations to improve the medical environment and accelerate the reform of the hierarchical medical system. Since 2018, Aug 19 has been established as "Chinese physicians' day", which reflects the concern and affirmation for Chinese health and health workers. However, these measures are far from enough (14).

## 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.

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## Conflict of interest

The authors declare that there is no conflict of interests.

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