Relationships between overwork, burnout and suicidal ideation among resident physicians in hospitals in Japan with medical residency programmes: a nationwide questionnaire-based survey

Masatoshi Ishikawa

ABSTRACT

Objectives This study examined the relationships between overwork, burnout and suicidal ideation among resident physicians working in hospitals throughout Japan.

Design A nationwide, questionnaire-based survey.

Setting Participating hospitals (n=416) were accredited by the Japanese Medical Specialty Board to offer medical residency programmes in 19 core specialties. Surveys were conducted in October 2020.

Participants Valid responses were obtained from 4306 physicians (response rate: 49%).

Outcome measures Items pertaining to the Japanese Burnout Scale, depressive tendencies and suicidal ideation were included in questionnaires. Multiple regression analyses were performed: suicidal ideation was the response variable; sex, age, core specialty, marital status, income, weekly working hours and workplace (ownership, number of beds, number of full-time physicians and regional classification) were explanatory variables.

Results Regarding the Japanese Burnout Scale, the highest score was recorded for ‘sense of personal accomplishment’, followed by ‘emotional exhaustion’ and ‘depersonalization’. Increased emotional exhaustion and depersonalisation were associated with longer working hours, but there was no such trend for sense of personal accomplishment. Depressive tendencies and suicidal ideation were noted in 24.1% and 5.6% of respondents, respectively. These percentages tended to increase when respondents worked longer hours. Several factors were significantly associated with suicidal ideation: female sex (reference: male, OR: 2.08, 95% CI: 1.56 to 2.77), ≥12 million yen income (reference: <2 million yen, OR: 0.21, 95% CI: 0.05 to 0.79), ≥100 working hours/week (reference:<40 hours/week, OR: 3.64, 95% CI: 1.88 to 7.04) and 600–799 hospital beds (reference:<200 beds, OR: 0.23, 95% CI: 0.07 to 0.82).

Conclusions Many Japanese residents demonstrated a tendency to experience burnout and suicidal ideation. Female sex, low income, long working hours and insufficient hospital beds were associated with suicidal ideation. To ensure physicians’ health and patients’ safety, it is necessary to advance workstyle reform for physicians.

INTRODUCTION

Workers in Japan endure prolonged working hours according to international standards. Inter-occupational comparison revealed that physicians’ working hours are particularly long, with those who work more than 60 hours/week, accounting for 42% of full-time physicians who work more than 200 days/year—the highest percentage for all the occupations compared. Among physicians, resident physicians (physicians who are undergoing training to attain medical specialisation) endure the longest working hours.

Suicides owing to depression and deaths owing to ischaemic heart and cerebrovascular disease from overwork are referred to as ‘karoshi’ (death from overwork). Karoshi is a public health issue unique to East Asia. Research conducted in Japan and internationally has provided ample evidence of the adverse effects of long working hours on health. According to a systematic review by Bannai and colleagues, long working hours are associated with depression, anxiety, sleep and coronary heart disease.

Resident physicians are prone to depression and burnout. In a systematic literature
review on factors associated with burnout among physicians overseas, it was established that younger age, female sex, being single, long working hours and job dissatisfaction were predictors of burnout. A systematic literature review established that 47.3% of resident physicians globally experienced burnout. In Australia, working hours have been associated with doubling the risk of suicidal ideation. Mental distress was the most important predictor of suicidal ideation among resident physicians in the first postgraduate year in Norway, with job stress, vulnerability (neuroticism), single status and fewer working hours as independent predictors.

In 2003, the Accreditation Council for Graduate Medical Education (ACGME) restricted the working hours of residents to less than 80 hours/week since long working hours adversely affect the health of resident physicians and increase the risk of medical errors. A systematic review that evaluated this measure concluded that the restrictions imposed on working hours by the ACGME were associated with improvements in emotional exhaustion and burnout syndrome. In Japan, depressive tendencies and burnout among interns and resident physicians have been reported in several single-centre studies; however, restrictions on working hours have not been imposed, as in the USA. Moreover, some physicians are unpaid, but no nationwide survey of resident physicians has been conducted in Japan.

In 2016, the Ministry of Health, Labour and Welfare (MHLW) established the Study Group on the Workstyle Reform for Physicians to examine measures aimed at pushing the workstyle reform forward. The study group introduced an overtime regulation to be enforced in April 2024. It will set an upper limit for resident physicians’ annual overtime at 1860 hours (the same level imposed by the ACGME in the USA). On advancing the establishment of an upper limit for resident physicians’ working hours in Japan at the policy level, it is useful to conduct a nationwide survey on the relationship between long working hours and burnout and suicidal ideation among resident physicians and to examine the implications for policies aimed at advancing the workstyle reform for physicians. Therefore, the purpose of this study is to provide suggestions for policies aimed at advancing workstyle reform by elucidating the relationship between overwork, burnout and suicidal ideation among resident physicians.

METHODS
Respondents
Paper-based survey questionnaires were distributed by mail to the training managers at 924 core hospitals accredited by the Japanese Medical Specialty Board (JMSB) to offer medical residency programmes in 19 core specialties. Valid responses were obtained from 4306 resident physicians at 416 hospitals (response rate: 49%). The response period of the survey was 14 days: 10–23 October 2020.

Survey items
Characteristics
A questionnaire-based web survey was conducted. First, the questionnaire included items pertaining to respondents’ attributes (sex, age, core specialty, marital status, annual income, weekly working hours and information pertaining to respondents’ workplace (hospital type by ownership, total number of hospital beds, number of full-time physicians and regional classification of the hospital)). Four response options for hospital types by ownership were presented: public (excluding national and public universities), national and public universities, private universities and private (excluding private universities). Concerning regional classification, the 344 secondary medical care zones in Japan were classified into Group 1 (urban zones), Group 2 (intermediate zones) and Group 3 (rural areas), based on the combination of population size and density as of 2019. Furthermore, the questionnaire included items pertaining to respondents’ working conditions, including the amount of time spent at the hospital and the number of shifts.

Suicidal ideation
Items pertaining to the presence/absence of suicidal ideation, which was highly prevalent among physicians in previous studies, were included in the survey. Physicians who indicated that they ‘sometimes think about suicide or death for several minutes a week’ and that they ‘think about suicide or death in detail several times a day or have made specific suicide plans or tried to commit suicide’ were considered to have suicidal ideation. Figure 1 shows the percentage of respondents who reported suicidal ideation for each range of time spent at the hospital.

The Japanese Burnout Scale (JBS)
According to the Maslach Burnout Inventory (MBI), which is used worldwide to measure burnout, the three main symptoms are emotional exhaustion, depersonalisation and a decreased sense of personal accomplishment. In Japan, based on previous instruments, including the MBI, Kubo and colleagues developed the JBS, which is in the public domain and widely used by Japanese researchers. The JBS comprises the 17 items shown in online supplemental table S1, including five response options: always, often, sometimes, rarely and never. As in the MBI, all 17 items can be classified into the three main symptoms of burnout.

The impact of the workstyle reform on the quality of medical care provided by resident physicians and their training.
Questions were asked about the impact of the advancement of the workstyle reform on the quality of the medical care provided by resident physicians and their training. The results were recorded.
Statistical analysis
To identify the underlying factors associated with suicidal ideation among resident physicians, a multiple regression analysis was conducted, in which the presence/absence of suicidal ideation was regarded as a response variable; sex, age, core specialty, marital status, income, weekly working hours and variables pertaining to the respondents' workplace (hospital type by ownership, total number of hospital beds, number of full-time physicians and regional classification of the hospital) were regarded as explanatory variables. Significance was set at p<0.05. STATA V.15.1 (StataCorp) was used for statistical analyses.

Patient and public involvement
Patients or the public were not involved in the design, conducting, reporting or dissemination plans of this research.

RESULTS
Participants’ demographic and work-related characteristics are shown in table 1. Suicidal ideation was observed in 5.6% of the respondents, and the percentage tended to increase with the amount of time spent at the hospital (figure 1). Moreover, 7.8% of the respondents in the group who reported spending 100 or more hours per week at the hospital experienced suicidal ideation.

Responses to the JBS are shown in table 2. Among the three components of the JBS, the mean score for the sense of personal accomplishment was highest, followed by emotional exhaustion and depersonalisation (the higher the score, the higher the possibility of burnout). The scores for emotional exhaustion and depersonalisation tended to be higher with longer working hours, but there was no such trend for the sense of personal accomplishment.

Table 3 shows the results of the multiple logistic regression analysis. Concerning the factors behind suicidal ideation among resident physicians, a significant association was found with female sex, low income, long working hours and a low number of hospital beds; whereas no significant association was established with age, marital status, child status, hospital department, hospital type by ownership, total number of hospital beds, number of full-time physicians and regional classification of the hospital.
ownership, the number of physicians at the hospital and the regional classification of the hospital.

Figure 2 shows respondents’ views on the impact of the advancement of the workstyle reform on the quality of medical care provided by resident physicians and their training: 21% indicated that the medical care provided by resident physicians and their training would improve considerably, 38% indicated that they would improve somewhat. In contrast, 5% indicated that it would deteriorate somewhat, and 3% indicated that it would deteriorate considerably.

Concerning the quality of medical training received by resident physicians, 17% indicated that it would improve considerably, 29% indicated that it would somewhat improve, 11% indicated that it would deteriorate somewhat and only 4% indicated that it would deteriorate considerably.

| Number of respondents | 4306 |
|-----------------------|------|
| Number of hours spent at the hospital per week |
| Less than 40 | 78 |
| 40–59 | 1305 |
| 60–79 | 1783 |
| 80–99 | 783 |
| 100 or more | 357 |
| Hospital type by ownership |
| Public | 1224 |
| National or public university | 1618 |
| Private university | 945 |
| Private | 519 |
| Total number of beds at the hospital |
| Fewer than 200 | 63 |
| 200–399 | 320 |
| 400–599 | 677 |
| 600–799 | 1412 |
| 800–999 | 1072 |
| 1000 or more | 762 |
| Number of full-time physicians at the hospital |
| Fewer than 100 | 421 |
| 100–199 | 768 |
| 200–299 | 592 |
| 300–399 | 733 |
| 400–499 | 476 |
| 500 or more | 1316 |
| Regional classification of the hospital |
| Major city | 2315 |
| Regional town or city | 1914 |
| Underpopulated area | 77 |

Table 1

Respondents’ attributes and the amount of time spent at the hospital

| Number of respondents | 4306 |
|-----------------------|------|
| Sex |
| Male | 2710 |
| Female | 1596 |
| Age (years) |
| 25–29 | 2587 |
| 30–34 | 1270 |
| 35–39 | 220 |
| 40 or older | 229 |
| Marital status |
| Married | 1904 |
| Unmarried | 2402 |
| Child status |
| Yes | 909 |
| No | 3397 |
| Core specialty |
| Internal medicine | 979 |
| Surgery | 437 |
| Orthopaedic surgery | 329 |
| Paediatrics | 297 |
| Obstetrics and gynaecology | 274 |
| Anaesthesiology | 272 |
| Otolaryngology | 227 |
| Psychiatry | 212 |
| Dermatology | 187 |
| Ophthalmology | 152 |
| Emergency medicine | 146 |
| Urology | 145 |
| Radiology | 139 |
| Neurosurgery | 125 |
| Pathology | 118 |
| Plastic surgery | 105 |
| General medicine | 89 |
| Rehabilitation medicine | 59 |
| Clinical examination | 14 |
| Part-time job |
| Yes | 2991 |
| No | 1315 |
| Annual income (including part-time job) |
| Under 2 million yen | 138 |
| 2–3.99 million yen | 1014 |
| 4–5.99 million yen | 1083 |
| 6–7.99 million yen | 879 |
| 8–9.9 million yen | 673 |
| 10–11.99 million yen | 343 |
Table 2  Descriptive statistics of Japanese Burnout Scale survey

| Three components | Japanese Burnout Scale                          | Score | Always | Often | Sometimes | Rarely | Never |
|------------------|------------------------------------------------|-------|--------|-------|-----------|--------|-------|
| E                | Sometimes, I feel like quitting this job.       | 2.1   | 145    | 416   | 806       | 1322   | 1667  |
| PA               | I am sometimes so absorbed in my work that I forget myself. | 3.6   | 58     | 623   | 1410      | 1180   | 1085  |
| D                | It can be a hassle to take/give this much attention to everything. | 2.8   | 237    | 869   | 1412      | 1310   | 528   |
| PA               | Sometimes, it feels like this job suits my personality. | 3.0   | 307    | 1203  | 1542      | 912    | 392   |
| D                | I sometimes get sick of seeing my colleagues’ and patients’ faces. | 1.8   | 61     | 252   | 569       | 1240   | 2234  |
| D                | I sometimes cannot help but feel that my job is boring. | 1.8   | 68     | 249   | 581       | 1250   | 2208  |
| E                | Sometimes, when I finish my work for the day, I feel relieved that it is finally over. | 3.2   | 541    | 1329  | 1273      | 913    | 300   |
| E                | Sometimes, before going to work, I feel like I would rather stay home than go to work. | 2.5   | 298    | 733   | 907       | 1329   | 1089  |
| PA               | Sometimes, I finish my work and think that it has been a good day. | 3.2   | 84     | 866   | 1700      | 1308   | 398   |
| D                | Sometimes, I do not want to talk about anything with my colleagues or patients. | 1.8   | 58     | 287   | 596       | 1364   | 2051  |
| D                | Sometimes, I feel as though the result of my work is not important. | 1.7   | 63     | 216   | 504       | 1081   | 2492  |
| E                | I sometimes I feel mentally overwhelmed because of my job. | 2.8   | 276    | 939   | 1275      | 1294   | 572   |
| PA               | There are times when I truly feel joy at my current job. | 3.2   | 112    | 931   | 1714      | 1208   | 391   |
| D                | Sometimes, I feel as though my current job does not mean much to me. | 1.7   | 48     | 203   | 516       | 1243   | 2346  |
| PA               | There are times when I enjoy my work so much that I do not notice how time passes by. | 3.7   | 75     | 526   | 1168      | 1420   | 1167  |
| E                | I sometimes feel exhausted both physically and mentally. | 2.8   | 216    | 1014  | 1372      | 1317   | 437   |
| PA               | I sometimes feel that I have done my job well. | 3.4   | 54     | 626   | 1727      | 1533   | 416   |

Average score for the three components

| D Depersonalisation | Respondents overall | 1.9 |
|---------------------|---------------------|-----|
|                     | Less than 40 hours/week | 1.9 |
|                     | 40–59 hours/week     | 1.8 |
|                     | 60–79 hours/week     | 1.9 |
|                     | 80–99 hours/week     | 2.0 |
|                     | 100 or more hours per week | 2.2 |

| E Emotional exhaustion | Respondents overall | 2.7 |
|------------------------|---------------------|-----|
|                        | Less than 40 hours/week | 2.4 |
|                        | 40–59 hours/week     | 2.5 |
|                        | 60–79 hours/week     | 2.7 |
|                        | 80–99 hours/week     | 2.9 |
|                        | 100 or more hours per week | 3.0 |

| PA Personal accomplishment (an item with a reverse score) | Respondents overall | 3.3 |
|----------------------------------------------------------|---------------------|-----|
|                                                          | Less than 40 hours/week | 3.6 |
|                                                          | 40–59 hours/week     | 3.4 |
|                                                          | 60–79 hours/week     | 3.3 |
|                                                          | 80–99 hours/week     | 3.3 |
|                                                          | 100 or more hours per week | 3.3 |
DISCUSSION

This was the first survey to reveal the reality of overwork among physicians in Japan, with 67.9% and 26.5% of the respondents reporting over 60 or 80 hours/week spent at the hospital, respectively. Japan’s Labour Standard Act stipulates that statutory working hours must not exceed 40 hours/week or 8 hours/day. Considering this, spending 60 hours/week working at the hospital amounts to 4 hours of overtime per day, which exceeds 80 hours of overtime per month.

Working over 60 hours/week over a period of several months is considered an occupational hazard and criteria for ‘karoshi’ (death from overwork) because it is strongly associated with the development of mental disorders and cardiovascular disease owing to the psychological burden.25 26 The results of this study suggest that two-thirds of the respondents may be in a working environment that exceeds the ‘karoshi’ criteria.

Table 3 Multiple logistic regression analysis with the presence/absence of suicide ideation as a response variable

| OR   | 95% CI       | P value |
|------|--------------|---------|
| Sex  |              |         |
| Male | Control      |         |
| Female | 2.08 | 1.56 to 2.77 | <0.01 |
| Age (years) |          |         |
| 25–29 | Control      |         |
| 30–34 | 0.95 | 0.70 to 1.31 | 0.77 |
| 35–39 | 1.11 | 0.59 to 2.10 | 0.75 |
| 40 or older | 0.83 | 0.37 to 1.89 | 0.67 |
| Marital status |          |         |
| Married | Control      |         |
| Unmarried | 1.35 | 0.97 to 1.85 | 0.07 |
| Child status |          |         |
| Yes | Control      |         |
| No | 1.22 | 0.76 to 1.96 | 0.43 |
| Core specialty |          |         |
| General internal medicine | Control |         |
| Surgery | 0.57 | 0.32 to 1.00 | 0.05 |
| Orthopaedic surgery | 0.88 | 0.48 to 1.63 | 0.69 |
| Paediatrics | 0.42 | 0.20 to 0.91 | 0.03 |
| Obstetrics and gynaecology | 0.60 | 0.31 to 1.17 | 0.13 |
| Anaesthesiology | 1.15 | 0.64 to 2.05 | 0.65 |
| Otolaryngology | 0.91 | 0.47 to 1.75 | 0.78 |
| Psychiatry | 0.80 | 0.39 to 1.64 | 0.54 |
| Dermatology | 0.79 | 0.39 to 1.59 | 0.51 |
| Ophthalmology | 1.47 | 0.77 to 2.82 | 0.24 |
| Emergency medicine | 1.44 | 0.72 to 2.88 | 0.31 |
| Urology | 0.80 | 0.34 to 1.84 | 0.59 |
| Radiology | 1.43 | 0.68 to 2.99 | 0.35 |
| Neurosurgery | 0.42 | 0.15 to 1.23 | 0.11 |
| Pathology | 1.70 | 0.86 to 3.35 | 0.13 |
| Plastic surgery | 0.99 | 0.43 to 2.30 | 0.99 |
| General medicine | 1.29 | 0.53 to 3.14 | 0.58 |
| Rehabilitation medicine | 0.64 | 0.15 to 2.78 | 0.55 |
| Clinical examination | n/a | n/a | n/a |
| Annual income |          |         |
| Under 2 million yen | Control |         |
| 2–3.99 million yen | 0.50 | 0.26 to 0.97 | 0.04 |
| 4–5.99 million yen | 0.61 | 0.31 to 1.18 | 0.14 |
| 6–7.99 million yen | 0.46 | 0.23 to 0.95 | 0.03 |
| 8–9.9 million yen | 0.61 | 0.29 to 1.26 | 0.18 |
| 10–11.99 million yen | 0.38 | 0.15 to 0.93 | 0.03 |
| 12 million yen or more | 0.21 | 0.05 to 0.79 | 0.02 |

Amount of time spent at the hospital per week

| OR   | 95% CI       | P value |
|------|--------------|---------|
| Less than 40 hours | Control |         |
| 40–59 hours | 2.02 | 1.12 to 3.62 | 0.02 |
| 60–79 hours | 2.23 | 1.22 to 4.07 | 0.01 |
| 80–99 hours | 2.72 | 1.45 to 5.07 | <0.01 |
| 100 or more hours | 3.64 | 1.88 to 7.04 | <0.01 |

Hospital type by ownership

| OR   | 95% CI       | P value |
|------|--------------|---------|
| Public | Control |         |
| National and public university | 1.80 | 0.93 to 3.47 | 0.08 |
| Private university | 1.58 | 0.74 to 3.37 | 0.24 |
| Private | 1.16 | 0.69 to 1.96 | 0.57 |

Total number of beds at the hospital

| OR   | 95% CI       | P value |
|------|--------------|---------|
| Fewer than 200 | Control |         |
| 200–399 | 0.54 | 0.19 to 1.54 | 0.25 |
| 400–599 | 0.36 | 0.11 to 1.14 | 0.08 |
| 600–799 | 0.23 | 0.07 to 0.82 | 0.02 |
| 800–999 | 0.42 | 0.12 to 1.54 | 0.19 |
| 1000 or more | 0.25 | 0.07 to 0.97 | 0.04 |

Number of full-time physicians at the hospital

| OR   | 95% CI       | P value |
|------|--------------|---------|
| Fewer than 100 | Control |         |
| 100–199 | 1.44 | 0.73 to 2.87 | 0.29 |
| 200–299 | 0.91 | 0.37 to 2.23 | 0.83 |
| 300–399 | 1.26 | 0.48 to 3.28 | 0.64 |
| 400–499 | 1.06 | 0.38 to 2.95 | 0.91 |
| 500 or more | 0.88 | 0.32 to 2.40 | 0.81 |

Regional classification of the hospital

| OR   | 95% CI       | P value |
|------|--------------|---------|
| Major city | Control |         |
| Regional town or city | 0.84 | 0.62 to 1.15 | 0.27 |
| Underpopulated area | 0.95 | 0.33 to 2.74 | 0.93 |

Table 3 Continued
Japan’s MHLW has introduced ‘Workstyle Reform for Physicians’ by establishing an upper limit for annual overtime at 960 hours as a general rule, with a special extension to 1860 hours. Overtime regulation should be enforced in April 2024. Various efforts are currently underway to implement this initiative. In addition to establishing an upper limit on overtime hours, the workstyle reform for physicians includes the promotion of task shifting and the establishment of an upper limit on consecutive working hours (28 hours) and mandatory rest between shifts (9 hours) in cases in which the special extension applies.

The special extension of the upper limit for annual overtime to 1860 hours is estimated to be less than 80 hours/week spent at the hospital on average. The current results indicate that more than one-quarter of the respondents may have worked more hours than this. Since such long working hours will become illegal as of April 2024, it is necessary to introduce measures aimed at reducing working hours as soon as possible.

The MHLW is pushing forward the ‘Workstyle Reform for Physicians’, which regulates the working hours of resident physicians in accordance with the regulations of the ACGME in the USA. ACGME regulations impose an 80-hour weekly limit, a 24-hour limit for consecutive working hours, and mandatory rest for 10 hours between shifts. In contrast, the workstyle reform for physicians in Japan will introduce the following regulations: an upper limit for annual overtime at 1860 hours, a 28-hour limit for consecutive working hours and a 9-hour mandatory rest between shifts. Hence, the regulations to be introduced under the workstyle reform in Japan are slightly looser than those imposed in the USA. This study did not investigate the workload and work culture that cause depression. Moreover, the shortage of doctors will likely become apparent because of the new upper limit of overtime hours imposed by the workstyle reform for physicians in Japan. Japan’s MHLW is promoting measures against the shortage and uneven distribution of physicians.

In the USA, the ACGME regulations on working hours for resident physicians are under review considering various evidence. Specifically, for residents specialising in surgery or internal medicine, no significant difference in patient outcomes or residents’ satisfaction was established in a comparison between an intervention group that worked in compliance with ACGME regulations on working hours and a control group without restrictions imposed on consecutive working hours or mandatory rest between shifts. In Japan, it is also necessary to conduct
such research and consider reviewing the system based on evidence from the perspective of patient safety, physicians’ health and their medical training.

The JBS was used in this study to assess resident physicians’ burnout status. Similar to the MBI, it covers three main symptoms of burnout: emotional exhaustion, depersonalisation and a decreased sense of personal accomplishment. In a previous study with nurses and home helpers, this factor structure was replicated in an exploratory factor analysis. In addition, this study reported that the relationship and consistency between these variables of the scale were strong, based on a confirmatory factor analysis. Moreover, the goodness-of-fit of the model was satisfactory. In a comparative study of the fit between the JBS and the Japanese version of the MBI-Human Services Survey (HSS) for healthcare professionals, including Japanese physicians, a confirmatory factor analysis based on the scoring method showed that the JBS had a greater goodness-of-fit than the Japanese version of the MBI-HSS. Moreover, in the JBS used in this study, the mean score for the decreased sense of personal accomplishment was highest, followed by emotional exhaustion and depersonalisation. A previous study that surveyed 1827 nurses reported mean scores of 3.25 for emotional exhaustion, 2.07 for depersonalisation and 3.56 for the decreased sense of personal accomplishment. In contrast, the mean scores of the resident physicians surveyed in this study were considerably lower for emotional exhaustion, and slightly lower for depersonalisation and a decreased sense of personal accomplishment.

The scores for emotional exhaustion and depersonalisation tended to be higher with longer working hours but there was no such trend for a decreased sense of personal accomplishment. A study of US surgery residents showed the same trend. The resident physicians felt a relatively high sense of personal accomplishment even when they worked long hours, which may have deterred burnout. Previous studies on burnout among resident physicians in Japan indicated a prevalence of 18%–33%. The risk factors indicated in the studies included long working hours, lack of sleep and insufficient career experience. This was independently associated with excessive paperwork, low autonomy, communication problems in the workplace, complaints from patients, competition among colleagues and anxiety about the future. Regarding the relationship between working hour regulations imposed by the ACGME and burnout among resident physicians, reducing working hours contributes to an improvement in burnout inventory scores. Moreover, self-care workshops have been shown to improve depersonalisation scores, and the introduction of meditation improves emotional exhaustion scores. Another study has shown that both individual-focused and organisational strategies may be useful in reducing burnout among resident physicians.

Suicidal ideation was observed in 5.6% of the respondents; however, this increased to 7.8% when they spent 100 or more hours per week at the hospital. In a previous study of staff physicians and resident physicians, suicidal ideation was reported in 3.6% of the respondents. In a questionnaire-based survey of American resident physicians specialising in surgery, 4.5% of the respondents reported suicidal ideation. The prevalence of suicidal ideation among the general US population has been reported to range from 2.0% to 3.3%. On the other hand, the 7.8% rate of suicidal ideation among physicians working long overtime hours identified in the present study was lower than the rates reported in some other countries, such as Australia, where 12% of residents were found to have suicidal ideation. The reasons for this lower rate require further investigation.

The multiple regression analysis identified several factors significantly associated with suicidal ideation: female sex, low income, long working hours and fewer hospital beds. Similarly, previous studies reported that physicians, particularly women, were at a relatively high risk of suicide. This study included a significantly higher number of male than female physicians, which is reflective of the overall higher number of male physicians in Japan. The influence of this disproportional distribution on the mental health of female physicians requires further consideration. However, a potential reason could be the deep-rooted cultural beliefs in Japan, which perpetuate that childcare is the mother’s responsibility; therefore, female physicians typically work shorter hours, do not work night shifts and do not hold management positions.

Long working hours and low income have also been associated with depression and suicidal ideation. In particular, low income and long working hours are characteristic of resident physicians in Japan, which may contribute to the high level of suicidal ideation among resident physicians.

The suicide rate among physicians in Europe is decreasing owing to improvements in the work environment. In Japan, it is also crucial to improve physicians’ work environment by advancing the workstyle reform for physicians and preventing suicide among physicians.

Limitations

This study had several limitations. First, because participation in the survey was voluntary, there was a possibility of selection bias. Physicians who responded to the questionnaire may have a relatively higher level of interest in the work environment and mental health of physicians than those who did not respond. It is also possible that physicians with severe depression could not complete the questionnaire. Nonetheless, many participants were recruited from several JMSB-accredited core hospitals nationwide, thus securing a representative sample. Second, the questionnaire was self-administered, which may have resulted in information bias. For example, as the information on the time spent in the hospital per week was not obtained by conducting a detailed time study, there was a possibility of misreporting. It is also not possible to verify
whether the entire time spent by resident physicians at the hospital constituted working hours. Moreover, the JBS and suicidal ideation measure were self-reported and not diagnosed by a doctor. The MBI is used internationally; however, it could not be used in this study owing to research budget limitations, as it requires a paid license. Therefore, this study was unable to draw comparisons with resident physicians overseas and in Japan. Further, as participation in this study was voluntary, the details of the definitions of the terms used in the survey were not specified to increase the response rate. Third, the relationship between long working hours and suicidal ideation has been established; however, the causal relationship is unclear. There may have been confounding factors that were not measured. Furthermore, this study did not examine the impact of the COVID-19 pandemic. Previous studies in other countries have indicated that the pandemic affected the workstyle and mental state of physicians, which increased depression, suicidal thoughts and burnout. In Japan, relocation of residents and increases in working hours during the COVID-19 pandemic were uncommon. As there have been no analogous studies in Japan prior to the COVID-19 pandemic, it is difficult to compare pre-pandemic and post-pandemic rates of burnout and suicidal ideation among resident physicians. Therefore, it would be useful to conduct a similar survey after the pandemic to compare the results and examine the mental health of physicians during peak stress situations, such as natural and man-made disasters.

CONCLUSION
In this study, many Japanese residents showed a tendency to experience burnout and suicidal ideation. Female sex, low income, long working hours and a low number of hospital beds are some factors associated with suicidal ideation. The solutions to these problems were discussed. To ensure the health of resident physicians, the quality of their medical training and the safety of their patients, it is necessary to strongly push the workstyle reform forward and gain a better understanding of the reality of resident physicians, including verification of the impact of the workstyle reform.

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Ethics approval This study involves human participants. This study was approved by the Medical Ethics Committee of the University of Tsukuba Faculty of Medicine (no. 1498). The objectives of this study and information pertaining to data confidentiality were addressed on the first page of the questionnaire. Those who wished to enrol in this study were informed that their participation was voluntary. No compensation was provided for participation. To ensure anonymity and confidentiality, the survey results were analysed separately from respondents’ personal information. Written informed consent was obtained from each participant.

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ORCID iD Masatoshi Ishikawa http://orcid.org/0000-0001-9855-3233

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