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

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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.

Strengths and limitations of this study

- ► This study analysed a nationwide survey on the relationship between long working hours and burnout and suicidal ideation among resident physicians.
- ► Participation in the survey was voluntary; there is potential for selection bias.
- ► The questionnaire was self-administered, which may have resulted in various information biases.
- ► While this study established the relationship between long working hours and suicidal ideation, confounding factors that were not measured may influence the results.

INTRODUCTION

Workers in Japan endure prolonged working hours according to international standards.[1] An 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.[2] Among physicians, resident physicians (physicians who are undergoing training to attain medical specialisation) endure the longest working hours.[3]

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.[4] 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.[5]

Resident physicians are prone to depression and burnout.[6–9] 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.[10] A systematic literature review established that 47.3% of resident physicians globally experienced burnout.[11] In Australia, working hours have been associated with doubling the risk of suicidal ideation.[12] 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.[13]

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.[14 15] 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.[16]

In Japan, depressive tendencies and burnout among interns and resident physicians have been reported in several single-centre studies[17 18]; however, restrictions on working hours have not been imposed, as in the USA. Moreover, some physicians are unpaid,[19] 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).[20] 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.[21] 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.[22] 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.[23] 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.[24] 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.[24]

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, and the results were recorded.

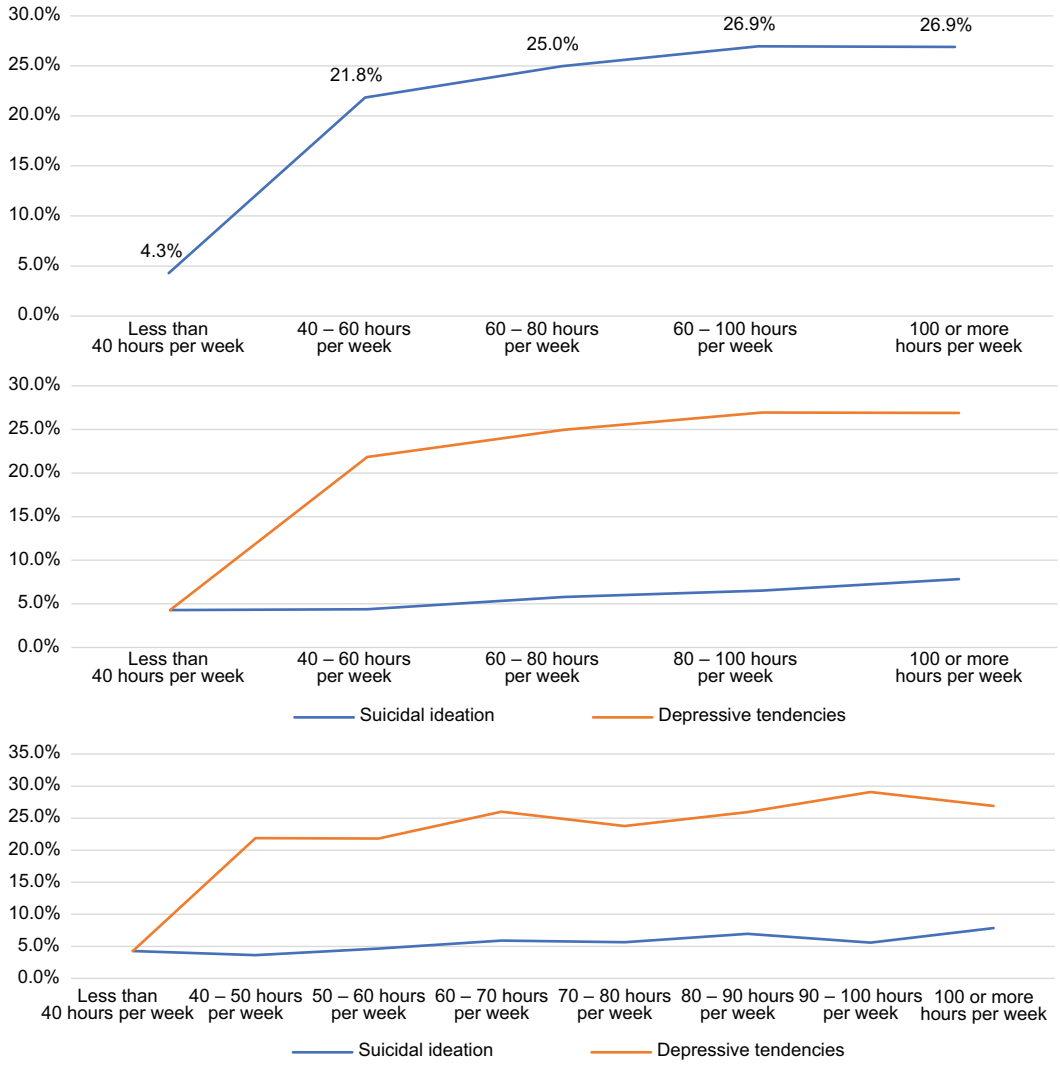

Figure 1 The percentage of resident physicians with suicide ideation for each range of time spent at the hospital per week.

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

Table 1 Respondents' attributes and the amount of time spent at the hospital

Number of respondents	4306	
Sex		
Male	2710	62.9%
Female	1596	37.1%
Age (years)		
25–29	2587	60.1%
30–34	1270	29.5%
35–39	220	5.1%
40 or older	229	5.3%
Marital status		
Married	1904	44.2%
Unmarried	2402	55.8%
Child status		
Yes	909	21.1%
No	3397	78.9%
Core specialty		
Internal medicine	979	22.7%
Surgery	437	10.1%
Orthopaedic surgery	329	7.6%
Paediatrics	297	6.9%
Obstetrics and gynaecology	274	6.4%
Anaesthesiology	272	6.3%
Otolaryngology	227	5.3%
Psychiatry	212	4.9%
Dermatology	187	4.3%
Ophthalmology	152	3.5%
Emergency medicine	146	3.4%
Urology	145	3.4%
Radiology	139	3.2%
Neurosurgery	125	2.9%
Pathology	118	2.7%
Plastic surgery	105	2.4%
General medicine	89	2.1%
Rehabilitation medicine	59	1.4%
Clinical examination	14	0.3%
Part-time job		
Yes	2991	69.5%
No	1315	30.5%
Annual income (including part-time job)		
Under 2 million yen	138	3.2%
2–3.99 million yen	1014	23.5%
4–5.99 million yen	1083	25.2%
6–7.99 million yen	879	20.4%
8–9.9 million yen	673	15.6%
10–11.99 million yen	343	8.0%
12 million yen or more	176	4.1%
Number of hours spent at the hospital per week		
Less than 40	78	1.8%
40–59	1305	30.3%
60–79	1783	41.4%
80–99	783	18.2%
100 or more	357	8.3%
Hospital type by ownership		
Public	1224	28.4%
National or public university	1618	37.6%
Private university	945	21.9%
Private	519	12.1%
Total number of beds at the hospital		
Fewer than 200	63	1.5%
200–399	320	7.4%
400–599	677	15.7%
600–799	1412	32.8%
800–999	1072	24.9%
1000 or more	762	17.7%
Number of full-time physicians at the hospital		
Fewer than 100	421	9.8%
100–199	768	17.8%
200–299	592	13.7%
300–399	733	17.0%
400–499	476	11.1%
500 or more	1316	30.6%
Regional classification of the hospital		
Major city	2315	53.8%
Regional town or city	1914	44.4%
Underpopulated area	77	1.8%

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.

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					

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			
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			
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			
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			
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			
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

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.

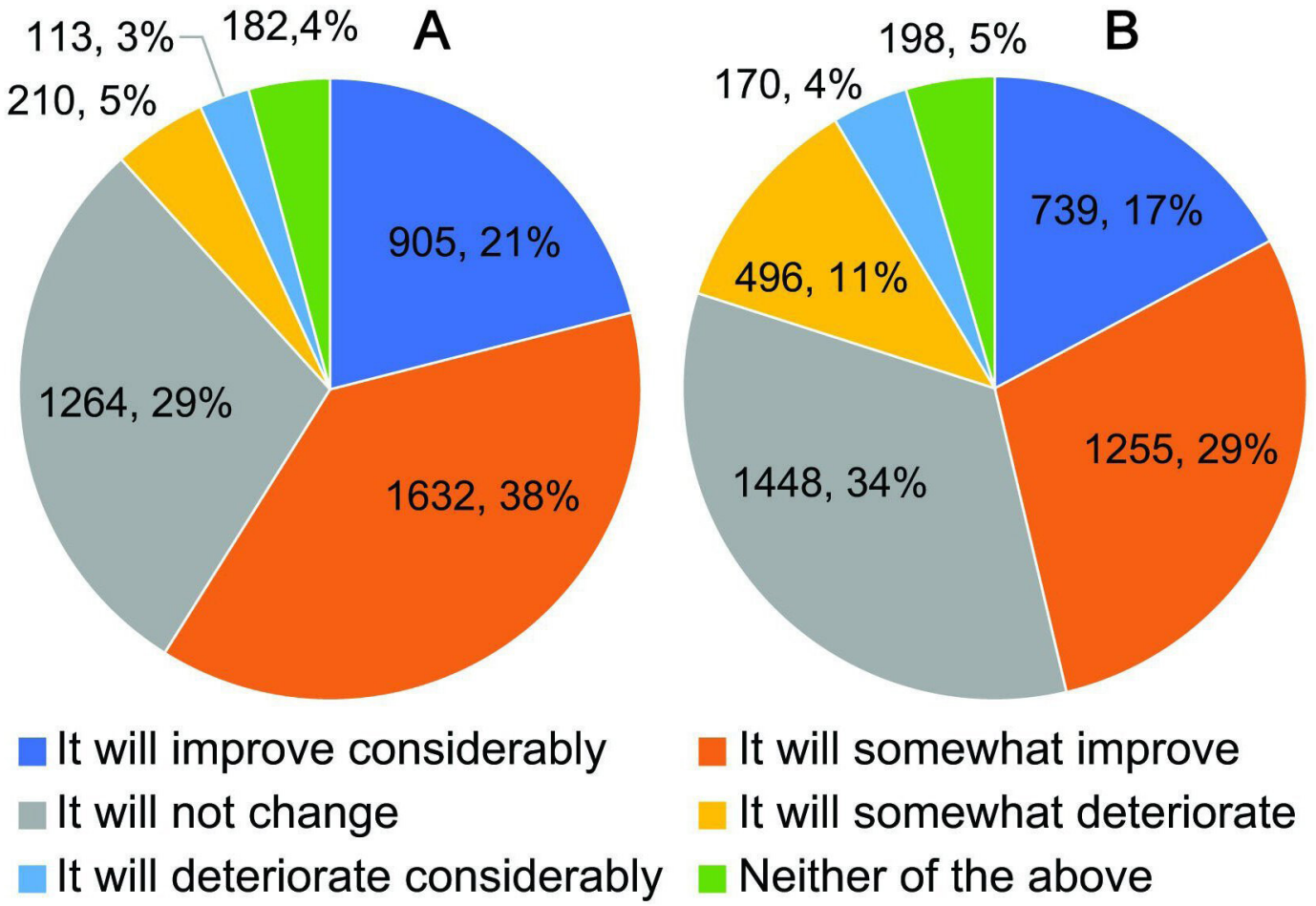

Figure 2 The impact of the advancement of the workstyle reform on the quality of medical care provided by resident physicians and their training. (A) The quality of medical care provided by resident physicians. (B) The quality of training received by resident physicians.

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.[27] 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.[20]

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.[28] 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.[29]

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.[30 31] 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.[32] 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 greater goodness-of-fit than the Japanese version of the MBI-HSS.[33] 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.[33] 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.[34] 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.[17 35] 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.[36] 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.[37] Another study has shown that both individual-focused and organisational strategies may be useful in reducing burnout among resident physicians.[16 38]

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.[22] In a questionnaire-based survey of American resident physicians specialising in surgery, 4.5% of the respondents reported suicidal ideation.[39] The prevalence of suicidal ideation among the general US population has been reported to range from 2.0% to 3.3%.[40 41] 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.[12] 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.[12 42]

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.[43] 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.[44]

Long working hours and low income have also been associated with depression and suicidal ideation.[7–9 45] 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.[46] 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.[47] In Japan, relocation of residents and increases in working hours during the COVID-19 pandemic were uncommon.[48] 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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Competing interests None declared.

Patient consent for publication Not applicable.

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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