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【 ORIGINAL ARTICLE 】

Resident Burnout and Work Environment

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Abstract:

Objective We examined the prevalence of burnout among resident doctors and its relationship with specific stressors.

Method We conducted a nationwide, online, cross-sectional survey in Japan with 604 resident doctors in 2018-2019.

Materials Participants completed the Maslach Burnout Inventory-General Survey to evaluate burnout and provided details of their individual factors and working environmental factors. Chi-square tests and t-tests were conducted for categorical and continuous variables, respectively. The association between burnout and resident-reported causes of stress, ways of coping with stress, number of times patient-safety incidents were likely to occur, and individuals who provide support when in trouble was analyzed using logistic regression analyses after controlling for confounding variables.

Results A total of 28% met the burnout criteria, 12.2% were exhausted, 2.8% were depressed, and 56.9% were healthy. After adjusting for sex, postgraduate years, type of residency program, marital status, number of inpatients under residents' care, number of working hours, number of night shifts, number of days off, and resident-reported causes of stress - excessive paperwork [odds ratio (OR): 2.24, 95% confidence interval (CI): 1.32-3.80], excessive working hours (OR: 2.75, 95% CI: 1.24-6.04), low autonomy (OR: 3.92, 95% CI: 2.01-7.65), communication problems at the workplace (OR: 2.24, 95% CI: 1.05-4.76), complaints from patients (OR: 6.62, 95% CI: 1.21-36.1), peer competition (OR: 2.22, 95% CI: 1.25-3.93), and anxiety about the future (OR: 2.13, 95% CI: 1.28-3.56) - were independently associated with burnout. The burnout group had more reported patient-safety incidents that were likely to occur per year (>10) (OR: 2.65, 95% CI: 1.01-6.95) and a lack of individuals who could provide support when in trouble (OR: 1.83, 95% CI: 1.01-3.34) than the non-burnout group.

Conclusion This study described the prevalence of burnout among residents who responded to our survey. We detected an association between burnout and resident-reported causes of stress, patient-safety incidents, and a lack of individuals who provide support when in trouble. Further interventional studies targeting ways to reduce these concerns are warranted.

Key words: burnout, Maslach Burnout Inventory, resident, resident doctor

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Introduction

Burnout is a psychological syndrome arising from a continued response to chronic interpersonal stressors while at work (1). Burnout among resident doctors is a serious problem in both Japan and other countries; specifically, young physicians experience various challenges during their first year of postgraduate training (residency) (2). These trainees (residents) are typically under a substantial amount of stress given their newly gained responsibilities (3), uncertainty in management (4), and involvement in unfamiliar multi-

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professional team environments (4). These rigors of residency training may negatively affect young physicians, resulting in depression (5) or decreased performance (6).

Japanese residency training during the survey period in 2018-2019 consisted of a mandatory two-year postgraduate program with compulsory rotations in clinical departments including internal medicine, emergency medicine, and community medicine. In addition, there were several elective rotations in departments such as general surgery, anesthesiology, pediatrics, and obstetrics/gynecology.

Previous studies have reported that the range of prevalence of resident burnout in Japan is 18-33% (7, 8). The risk factors of burnout include long working hours (9-13), lack of sleep (14), and little career experience (15); however, some studies have reported no correlation between long working hours (7, 16) or little career experience and burnout (7, 17). Haoka et al. (18) reported that mental workload and interpersonal relationship problems are job stressors, and reward from work buffers against depressive symptoms in medical residents.

The association between the potential causes of stress and burnout have not been fully investigated; therefore, this study aimed to identify the burnout prevalence in Japan and explore the correlation between resident-reported causes of stress-e.g. working hours, peer competition, complaints from patients, and excessive paperwork-and burnout.

Materials and Methods

Study design and participants

We conducted a nationwide online cross-sectional survey among first-year postgraduate (PGY-1) and second-year postgraduate (PGY-2) resident physicians in Japan between March 1 and March 31, 2019. Requests for research cooperation were sent to program directors at 1,040 hospitals via postal mail. The cover letter informed recipients that their participation was voluntary and that their responses would remain anonymous. The survey was distributed to hospitals that agreed to participate in the study. The web-based survey was generated using the online survey tool Creative Survey (http://creativesurvey.com, Tokyo, Japan), based on previous studies that addressed physicians' burnout (11, 19). An e-mail was sent to participants via program directors, and it had uniform resource locators and quick response codes directing them to complete the survey. Participants were asked to reflect on the past year and respond to each question.

Questionnaire

We asked for participants' individual demographic characteristics, such as their age, sex, PGY (1 or 2), marital status, presence of, children, social history (smoking/drinking), and working environment factors, including the type of residency program, number of inpatients under residents' care, residence, number of working hours on weekdays and weekends, number of night shifts per month, number of days off per month, and number of private hours per week. In addition, dropout intention, resident-reported causes of stress, ways of coping with stress, number of times patient-safety incidents are likely to occur per year, and the presence of individuals who provide support when in trouble were also assessed.

With respect to the resident-reported causes of stress, we initially sent 25 junior residents of St. Luke's International Hospital (response rate 22/25; 88%) a questionnaire from October 1 through October 14, 2018, asking them to freely describe what they felt was stressful about their residency life. The survey items were classified into the following 12 categories: excessive paperwork, excessive working hours, insufficient holidays, low autonomy, insufficient salary, communication problems at the workplace, power-based harassment at the workplace, complaints from patients, family problems, peer competition, excessive pressure, and anxiety about the future.

As in previous studies (18, 20), we calculated the mean weekly working time as follows:

Mean weekly working time = [5 × (*mean working hours per day on weekdays*)] + [2× (*mean working hours per day on weekends*)] + [7× (*monthly number of night duties*/30) × (24 - *mean working hours per day on weekdays*)].

We assessed burnout prevalence among residents using the Japanese version of the Maslach Burnout Inventory-General Survey (MBI-GS) (21), a validated version of the MBI that is currently considered the gold standard for measuring burnout (22). This 16-item questionnaire contains 3 subscales that evaluate what are considered the 3 major domains of burnout: emotional exhaustion, cynicism (depersonalization), and professional efficacy (personal accomplishment). All 16 items are scored on a 7-point scale ranging from "0" (*never*) to "6" (*everyday*), and the total scores for each subscale were divided by the number of items for the subscale. We used the cut-off points suggested by Kalimo et al. (23), who reported that the cut-offs for exhaustion and cynicism were >3.5 and that of professional efficacy was <2.5.

To assess burnout, we used the revised exhaustion +1 criterion developed by Kitaoka and Masuda (24). Essentially, we included those who met the exhaustion +1 criterion originally introduced by Brenninkmeijer and VanYperen who viewed burnout as a binary outcome (25); however, the revised exhaustion +1 criterion consists of five classifications to examine burnout in detail. Those with a high score for exhaustion and either high score for cynicism or low score for professional efficacy are determined to be "burned out." Among them, those with a high score for cynicism but a low score for professional efficacy are determined to be "severely burned out." Those with a high score for exhaustion but low scores for cynicism and professional efficacy are determined to be "exhausted." Those with a high score for cynicism but low scores for exhaustion are determined to be "in a depressive state." Finally, those with a low score for both exhaustion and cynicism are determined to be "in good

Table 1. Comparison of Burnout Prevalence Per Occupational Group Based on Previous Studies.

Occupations of Japanese professionals	Reference	Severely burned out n (%)	Burned out n (%)	Exhausted n (%)	Depressed n (%)	Healthy n (%)
Resident physicians	Current study	67 (11.1)	102 (16.9)	74 (12.3)	17 (2.8)	344 (57.0)
Mental health nurses	(27)	94 (10.8)	195 (22.3)	93 (10.6)	29 (3.3)	463 (53.0)
Neurologists/neurosurgeons	(19)	133 (5.9)	318 (14.0)	391 (17.2)	32 (1.4)	1,396 (61.5)
Company employees	(26)	66 (5.3)	118 (9.5)	59 (4.8)	50 (4.0)	949 (76.4)

health."

To compare the study sample with the general population of Japanese workers, the MBI-GS scores were compared between the current participants and 2,843 Japanese office workers and 751 civil servants from an earlier investigation (26). In addition, we compared our data with those of 874 Japanese healthcare nurses (27) and 2,270 neurologists/neurosurgeons (19) reported in previous studies.

Statistical analyses

We first compared the baseline characteristics between those with and without burnout using chi-squared difference tests for categorical variables and *t*-tests for continuous variables. Given the limited information available about the interaction effects of potential risk factors of burnout that we were trying to evaluate, including type of residency program, number of inpatients under residents' care, number of working hours per week, number of night shifts per month, and number of days off per month, we used logistic regression analyses with stepwise forward selection by integrating data of residents' background into the model to determine whether or not any of them were significant factors. Specifically, residents' background, age, postgraduate years, and marital status were included in the model. Concerning stepwise forward selection, we established the probability for entry into the model as 0.05 and that for removal as 0.1. Since causes of stress are prone to be highly correlated, multicollinearity of independent variables was assessed by calculating values for tolerance and the variance inflation factor (VIF). Values for tolerance >0.2 and for VIF <5 were considered as being compatible with a low collinearity (28). All analyses were performed using the SPSS 26.0J software program (IBM Japan, Tokyo, Japan) and STATA 11 (STATA, College Station, USA) with two-tailed significance set at $p<.05$.

Ethical considerations

A letter of informed consent was distributed to the residents by the program director via e-mail. Consent was implied by completion of the questionnaire. This study was approved by the institutional review board at St. Luke's International Hospital in Tokyo, Japan (Number: 18-R144) and was conducted in accordance with the Declaration of Helsinki.

Results

Among 1,040 hospitals approached to participate in this study, 189 (18.2%) agreed to disseminate the survey (n = 4,754 residents). A total of 604 (12.7%) individuals participated [mean age = 27±2.8 years old; 62.9% men (n = 380); 54.5% PGY-1 (n = 329)].

Burnout among resident doctors

A total of 28% of resident doctors in Japan met the criteria for burnout (severely burned out: 11.1%) (Table 1). In addition, 12.3% were exhausted, 2.8% were depressed, and 57.0% were healthy.

The comparison between subjects with and without burnout

Table 2 shows a comparison of residents' demographics between those with and without burnout. The percentage of women and PGY-1 residents among those with burnout was significantly higher than among those without burnout. The burnout prevalence was higher in university hospitals and combined programs than in community hospitals. There were no significant differences in age, marital status, having children, number of night shifts, number of working hours, number of days off, and number of private hours between the two groups. Burned-out residents reported more stressful events than non-burned-out residents, as shown in Table 2.

Regarding ways of coping with stress, those with burnout reported "gambling" significantly more frequently than did those without burnout. Regarding individuals who provide support when in trouble, nearly half of residents with burnout chose co-residents, and almost one-quarter chose their family members. The percentage that chose "none" was significantly higher among those with burnout than among those without it.

Adjusted odds ratio (OR) for the multivariate model of burnout

The results of the multivariate analyses are shown in Table 3. After adjusting by sex, PGY, type of residency program, marital status, number of inpatients under residents' care, number of working hours, number of night shifts, and number of days off, several resident-reported causes of stress were shown to be independently and strongly associated with burnout, as follows: excessive paperwork [OR:

Table 2. Comparison of Japanese Medical Residents' Demographics and Maslach Burnout Inventory-General Survey Scores in Those with and without Burnout.

	Burnout (+) n=169	Burnout (-) n=435	p
Women, n (%)	77 (45.6)	147 (33.8)	**0.009**
Age (years), mean (SD)	27.1 (2.7)	26.0 (2.9)	0.689
PGY-1, n (%)	104 (61.5)	225 (51.7)	**0.036**
Type of residency program, %			**0.005**
University	45 (26.6)	74 (17.0)	
Community	101 (59.8)	319 (73.3)	
Combined	23 (13.6)	42 (9.7)	
Number of beds, n [IQR]	520 [1,020]	520 [300]	0.68
Number of inpatients under resident's care, n (%)			0.834
<6	42 (24.9)	110 (25.3)	
6-10	80 (47.3)	223 (51.3)	
11-15	35 (20.7)	78 (17.9)	
16-20	6 (3.6)	11 (2.5)	
>20	6 (3.6)	13 (3.0)	
Residence, n (%)			0.255
Dormitory (inside hospital)	27 (16.0)	63 (14.5)	
Dormitory (outside hospital)	58 (34.3)	124 (28.5)	
Own home	84 (49.7)	248 (57.0)	
Married, n (%)	21 (12.4)	76 (17.5)	0.140
Having children, n (%)	5 (3.0)	22 (5.1)	0.380
Drinking, n (%)			0.214
None	12 (7.1)	28 (6.4)	
Occasional	100 (59.2)	243 (55.9)	
1-2 times/week	26 (15.4)	103 (23.7)	
3-4 times/week	20 (11.8)	41 (9.4)	
Everyday	11 (6.5)	20 (4.6)	
Smoking, n (%)			0.451
None	158 (93.5)	402 (92.4)	
Previously	4 (2.4)	19 (4.4)	
Current	7 (4.1)	14 (3.2)	
No. of working hours/week, mean (SD)	72.9 (11.3)	70.7 (11.8)	**0.01**
No. of night shifts/month, mean (SD)	3.9 (1.7)	3.9 (1.7)	0.75
No. of hours slept/night, mean (SD)	6.02 (0.82)	6.17 (0.83)	0.59
No. of days off/month, mean (SD)	4.03 (1.96)	4.16 (2.0)	0.45
No. of private hours/week, mean (SD)	11.6 (10.2)	11.8 (9.9)	0.57
Dropout intention, n (%)	72 (42.6)	58 (13.3)	**<0.01**
Resident-reported causes of stress, n (%)			
Excessive paperwork	61 (36.1)	56 (12.9)	**<0.01**
Excessive working hours	44 (26.0)	18 (4.1)	**<0.01**
Insufficient holidays	59 (34.9)	46 (10.6)	**<0.01**
Low autonomy	52 (30.8)	22 (5.1)	**<0.01**
Insufficient salary	44 (26.0)	38 (8.7)	**<0.01**
Communication problems at the workplace	37 (21.9)	16 (3.7)	**<0.01**
Power harassment	15 (8.9)	8 (1.8)	**<0.01**
Complaints from patients	15 (8.9)	2 (0.5)	**<0.01**
Family problems	13 (7.7)	4 (0.9)	**<0.01**
Peer competition	60 (35.5)	47 (10.8)	**<0.01**
Excessive pressure	24 (14.2)	10 (2.3)	**<0.01**
Anxiety about the future	78 (46.2)	71 (16.3)	**<0.01**

2.24, 95% confidence interval (CI): 1.32-3.80], excessive working hours (OR: 2.75, 95% CI: 1.24-6.04), low autonomy (OR: 3.92, 95% CI: 2.01-7.65), communication problems at the workplace (OR: 2.24, 95% CI: 1.05-4.76), complaints from patients (OR: 6.62, 95% CI: 1.21-36.1), peer competition (OR: 2.22, 95% CI: 1.25-3.93), and anxiety about the future (OR: 2.13, 95% CI: 1.28-3.56).

Statistics for collinearity were also applied, and the value

Table 2. Comparison of Japanese Medical Residents' Demographics and Maslach Burnout Inventory-General Survey Scores in Those with and without Burnout. (Continued)

	Burnout (+) n=169	Burnout (-) n=435	p
Ways of coping with stress, n (%)			
Exercise	21 (12.4)	67 (15.4)	0.352
Chatting	31 (18.3)	104 (23.9)	0.141
Sleep	56 (33.1)	121 (27.8)	0.197
Smoking	8 (4.7)	33 (7.6)	0.211
Shopping	7 (4.1)	18 (4.1)	0.998
Music	7 (4.1)	21 (4.8)	0.719
Eating	8 (4.7)	20 (4.6)	0.943
Being alone	17 (10.1)	25 (5.7)	0.061
Gambling	3 (1.8)	1 (0.2)	**0.036**
Other	11 (6.5)	25 (5.7)	0.723
Individuals who provide support when in trouble, n (%)			
Co-residents	80 (47.3)	236 (54.3)	0.127
Senior residents	6 (3.6)	6 (1.4)	0.086
Attending physicians	2 (1.2)	10 (2.3)	0.378
Program director	4 (2.4)	2 (0.5)	**0.034**
Family	38 (22.5)	94 (21.6)	0.815
Friends	14 (8.3)	40 (9.2)	0.725
None	22 (13.0)	30 (6.9)	**0.016**
Others	1 (0.6)	12 (2.8)	0.099
Number of times patient-safety incidents were likely to occur, n (%)			0.066
0	11 (6.5)	41 (9.4)	
1-5	118 (69.8)	329 (75.6)	
6-10	24 (14.2)	40 (9.2)	
>10	13 (7.7)	19 (4.4)	
MBI-GS scores, mean (SD)			
Exhaustion	4.67 (0.7)	2.49 (1.2)	**0.001**
Cynicism (depersonalization)	3.80 (1.4)	1.60 (1.1)	**0.001**
Professional efficacy	2.03 (1.1)	2.75 (1.3)	**0.001**
Ex>3.5, n (%)	169 (59.2)	74 (17.0)	**0.001**
Cy>3.5, n (%)	111 (65.7)	17 (3.9)	**0.001**
PE<2.5, n (%)	125 (74.0)	189 (43.4)	**0.001**

+Participants with burnout;-Participants without burnout

SD: standard deviation, IQR: interquartile range, PGY: postgraduate year, MBI-GS: Maslach Burnout Inventory General Survey, Ex: exhaustion, Cy: cynicism, PE: professional efficacy

for tolerance was >0.5 while that for VIF was ≤ 1.8, indicating no significant collinearity among the variables tested in the model. Notably, compared with the reference category (an incident was never likely to occur), A burned-out status was significantly associated with >10 patient-safety incidents likely to occur per year (OR: 2.65, 95% CI: 1.01-6.95). The group with burnout was also more likely to report a lack of individuals who provided support when in trouble (OR: 1.83, 95% CI: 1.01-3.34) than the group without burnout.

Discussion

To our knowledge, this was the largest study exploring the association between resident-reported causes of stress and burnout in Japan. We found that over one-quarter of Japanese residents who responded to our survey met the criteria for burnout. Among major stress factors, excessive paperwork, excessive working hours, low autonomy, communication problems at the workplace, complaints from patients, peer competition, and anxiety about the future were associated with burnout. This study also showed that a lack of a support system may be associated with burnout. In addition, burnout was significantly associated with >10 patient-safety incidents per year.

Table 1 summarizes the classifications burnout and associated factors described above and the number of resident doctors in Japan falling within each classification. Compared with other occupations, a similar trend was noted for Japanese resident doctors and Japanese mental health nurses (27). Residents had a higher percentage of burnout than did Japanese neurologists/neurosurgeons (19) and Japanese company employees (26).

Residents are at a higher risk of excessive stress than are senior doctors because they have less medical knowledge

Table 3. Multivariate Analysis by Logistic Regression Model of Factors Associated with Residents' Burnout in Japan.

	OR	p	95% CI
Resident-reported causes of stress			
Excessive paperwork	2.24	**0.003**	1.32–3.80
Excessive working hours	2.75	**0.012**	1.24–6.04
Low autonomy	3.92	**<0.01**	2.01–7.65
Communication problems at the workplace	2.24	**0.036**	1.05–4.76
Complaints from patients	6.62	**0.029**	1.21–36.1
Peer competition	2.22	**0.006**	1.25–3.93
Anxiety about the future	2.13	**0.004**	1.28–3.56
Number of patient-safety incidents likely to occur			
0	Reference		
1–5	1.26	0.50	0.65–2.43
6–10	1.98	0.103	0.87–4.49
>10	2.65	**0.047**	1.01–6.95
Individuals who provide support when in trouble			
None	1.83	**0.048**	**1.01–3.34**

OR: odds ratio, CI: confidence interval

and clinical experience (29). Furthermore, a higher risk of burnout was associated with role ambiguity and low levels of decisional latitude (30, 31). Regarding the comparison with the general working population, the higher prevalence of burnout among residents was consistent with the findings of previous studies in other countries (32, 33); physicians tend to work more, display a higher prevalence of emotional exhaustion and cynicism (depersonalization), and report lower satisfaction with work-life balance than the general working population (32).

Of note in the present study is that the "perception of excessive working hours as a cause of stress" was associated with burnout in the multivariate analysis, although the mean working hours were not statistically significantly associated with burnout. This result implies that residents' perception of working hours can be more important than actual total working hours. Some residents who want to gain experience may not see long working hours as a burden but as a positive aspect of their job (34). However, it is easy to surmise that residents who are forced to work excessive hours due to unfamiliarity or inexperience may feel a different burden than the residents mentioned above. Therefore, although several studies have reported that reducing working hours may lead to a reduction in burnout (10), our results suggest that simply reducing the number of working hours may be insufficient to reduce burnout, as previously reported (7), and it may be essential to focus on the types of stress felt by each resident and individual resilience.

Previous studies reported difficulties perceived by physicians as communication problems at the workplace, excessive working hours, low autonomy, low respect received from seniors and peers, competition among colleagues, complaints from patients, and anxiety about the future (2, 35, 36). Similarly, our present study suggested that these stressors may lead to burnout among resident physicians. Furthermore, excessive paperwork was newly recognized as a stressor that resident doctors reported and could be associated with burnout.

Regarding protective factors, a previous study showed that support from co-workers has a buffering effect on depressive symptoms and burnout (11), supporting our finding that a lack of a support system to turn to when in trouble was associated with burnout. Although our questionnaire did not clarify whether or not residents who did not ask for support actually wanted help, those who do not wish to share their concerns with others should be monitored regularly for burnout warning signs.

Our findings concerning the relationship between burnout and patient-safety incidents are also consistent with previous studies (37-39). Physical exhaustion owing to substantial working hours and lack of sleep are related to such incidents. Interventions to reduce burnout should thus be promoted in an effort to reduce the number of incidents.

Several limitations associated with the present study warrant mention. First, the response rate was low and accounted for approximately 3% among 18,000 Japanese residents (PGY-1 and 2). Selection bias might thus limit possible generalizations of the prevalence rate and risk factors associated with burnout. In terms of sample representativeness, on comparing the 2018 residency data published by the Ministry of Health Labour and Welfare (40, 41) with the sample of the present study, the percentage of university hospitals was lower in the current study (overall: 39.7% vs. current study: 30.4%) while the percentage of women (overall: 34.4% vs. current study: 33.1%) and residents in PGY-1 (overall: 51.4% % vs. current study: 55.0%) were similar. Second, seasonal changes in burnout prevalence were not addressed. Third, some causes of stress reported by residents did not directly reflect the amount of burden. For example, excessive paperwork, complaints from patients, and low

autonomy are subjective and could not be compared among residents. Furthermore, how residents perceive stress varies based on their innate resilience (42). We therefore could not simply conclude that any one strategy, such as reducing paperwork, would reduce stress or burnout. Stakeholders should be aware that, if residents experience excessive stress owing to such matters, these could be warning signs of burnout. In addition, the number of incidents that were likely to occur was self-reported, and some residents may have been reluctant to report all incidents because of perceived negative consequences, such as legal liability and unpleasant working conditions (43). Finally, we did not conceal our study aims. This might have inflated the correlations observed because participants might have identified with the study aim.

Although numerous factors have been studied, burnout prevalence varies greatly among studies (32, 44-47). One reason for this is that the term "burnout" is vague, and different researchers use different definitions. Such differences in the definitions and methods for assessing burnout are serious issues and have been noted frequently (48). However, we believe that it is worthwhile to compare different occupations using the same methods in this study.

Early screening of residents who meet or are close to meeting the criteria of burnout should be conducted to ensure that early intervention can be implemented. An improved well-being, quality of life, resilience, and happiness are associated with reduced burnout (49); therefore, a wellness curriculum focusing on offering residents feasible and increase resilience and happiness is recommended (50). Furthermore, previous reports have also suggested that team debriefing and workshops after difficult clinical events may be useful for reducing resident burnout (51, 52). Further studies that explore the effectiveness of intervention for burnout prevention are warranted.

Conclusion

A total of 28% of resident doctors who responded to our survey met the criteria for burnout. Resident-reported causes of stress-excessive paperwork, excessive working hours, low autonomy, communication problems at the workplace, complaints from patients, peer competition, and anxiety about the future-were independently associated with burnout. Patient-safety incidents were more likely to occur and individuals who provide support when in trouble were more likely to be lacking in the burnout group than in the non-burnout group.

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

The authors state that they have no Conflict of Interest (COI).

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