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Original Article

Surveys of Burnout Among Physicians in Taiwan

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Objectives: To examine severity and prevalence of burnout among physicians in Taiwan, we conducted a review of epidiomiological studies on burnout problems in physicians of Taiwan.
Methods: We performed a systemic research in National Digital Library of Theses and Dissertions, Airiti Library, Google Scholar, PubMed, Scopus, and Web of Science for surveys measuring the levels of burnout among physicians in Taiwan. We appraised each survey ascertaining the instrument, and compared the content, results and characteristics of these surveys.
Results: We found 15 surveys measuring burnout of physicians during 2008 to 2014. All of them were cross-sectional studies using either Chinese version of Maslach Burnout Inventory (MBI) or Chinese version of Copenhagen Burnout Inventory (CBI) as a measuring tool. For those used MBI, the scores of burnout could not be interpreted and compared, given pending overall score compilation. For those used CBI, the levels of burnout were rather high. Age, gender, specialty, working hours, and work loads were notable factors associated with burnout of physicians in Taiwan.
Conclusion: The selection of an instrument for further research should be with caution for future cross-national comparison. Longitudinal, multicenter and intervention studies need to be conducted at a national level to assess burnout levels among susceptible age groups and subspecialties.

Key words: *physician burnout, Maslach Burnout Inventory, Copenhagen Burnout Inventory, medical professionals, Taiwan*

Introduction

Physicians in Taiwan seem to be of high risk of overwork and burnout. From 2008 to 2012, there were 7 male physicians died after work and concerns of "Karoshi" (a Japanese word meaning death from overwork) have raised discussion.[1] Physician shortage of life-saving subspecialties (especially surgery, obstetrics and gynecology, pediatrics, and emergency medicine) has also aroused public's attention. In response to the overload problems of health care workers, the Ministry of Health and Welfare has implemented restrictions of work hours for certain types of health care workers, including physicians under training, and has pledged to have all employed physicians covered by the Labor Standards Act by September 1, 2019.

Burnout is a pervasive problem for physicians in Taiwan and also in many other countries. Recent studies from the United States indicated that physicians' burnout was on the rise during the period from 2011 to 2014,[2] and had reached epidemic levels, with prevalence near or exceeding 50% of both physicians in training and practicing physicians.[3] Researchers have found that physicians' burnout is highly associated with increased risks for medical errors, reduced quality of care, attitudes toward patients, poor physicians' health, and reduced career satisfaction and

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productivity.[4,5] Although there are substantial differences by specialty, physicians at the front line of care reported the highest rates of burnout. In recent studies by Shanafelt et al., emergency physicians were found to have the highest rate of burnout compared with physicians in general and the general population. In the meanwhile, older age and being married were associated with lower level of burnout.[2]

According to Schaufeli et al., the burnout syndrome is characterized by losing enthusiasm (emotional exhaustion), treating people as if they were objects (depersonalization), and having sense that the work is no longer meaningful (low personal accomplishment).[6] The Maslach Burnout Inventory-Human Services Survey (MBI-HSS) with three dimensions assessing by 22 questions has been widely used to assess the degree of burnout among medical staffs.[7] These three dimensions are emotional exhaustion (9 items), depersonalization (8 items), and low personal accomplishment (5 items). The score of each sub-scale is calculated by summation and can be categorized into low, medium and high levels. The degree of burnout is high if emotional exhaustion score is ≥ 27, depersonalization score is ≥ 13, and personal accomplishment score is ≤ 31. The degree of burnout is medium if emotional exhaustion score ranges from 17 to 26, depersonalization score ranges from 7 to 12, and personal accomplishment score ranges from 38 to 32. The degree of burnout is low if emotional exhaustion score is ≤ 16, depersonalization scores is ≤ 6, and personal accomplishment score is ≥ 39.[8]

Besides the MBI, the Copenhagen Burnout Inventory (CBI) developed by Kristensen et al. have gained popularity in the field of burnout research. It consists of three subscales measuring three domains of burnout in terms of physical and psychological exhaustion: (1) personal burnout (5 items), experienced by the person regardless of occupational status; (2) work-related burnout (5 items), perceived by the person as related to work; (3) client-related burnout (6 items), perceived by the person as related to work with clients. Each scale ranges from 0 to 100 points. As compared to the MBI, the CBI assesses the status of burnout in a more straightforward way, and has an advantage in assessing burnout in workers in all work sectors including non-service sectors and non-professional workers.[9] Previous studies from Taiwan indicated that the Chinese version of CBI had good reliability and validity.[10]

Although physicians are commonly perceived to have heavy workloads and high levels of burnout, systematic review on this issue is still rare. Little is known about the prevalence, distribution, severity and associated factors of physicians' burnout. The aim of this study is to review existing studies concerning physicians' burnout in Taiwan and to provide recommendations for future work in this field.

Methods

We systematically searched for studies which measured the level of burnout among physicians in Taiwan. A search of National Digital Library of Theses and Dissertations in Taiwan was performed both in English and Chinese (search terms: 'physician(s)' and 'burnout;' 'doctor(s)' and 'burnout;' 'medical' and 'professional(s)' and 'burnout'). The authors further searched available literature using Airiti Library, Google Scholar, PubMed, Scopus, and Web of Science both in English and Chinese (search terms: 'physician(s)' and 'burnout' and 'Taiwan;' 'doctor(s)' and 'burnout' and 'Taiwan;' 'medical' and 'professional(s)' and 'burnout' and 'Taiwan'). For inclusion, we screened titles and abstracts. When titles and abstracts did not provide sufficient information for inclusion or exclusion, we read the full-text of these publication. Studies were included if they assessed physicians' burnout with a validated instrument. After inclusion, no quality appraisal was applied because the aim of this study was to make a complete overview of existing surveys concerning physicians' burnout in Taiwan.

Results

Our database search retrieved 30 master theses and eight journal articles. After removing duplicates, 36 records remained to be reviewed. Records without accessible full-text and those not measuring burnout of physicians were excluded. Among the remaining, we checked the references for additional publications. We screened 20 studies with full-text for eligibility. Among them, five studies were excluded, including three studies that used either structural equation modeling or hierarchical multiple regression to examine hypotheses and did not show the actual scores of burnout in text, one study that measured burnout among all employees in a regional hospital and did not separate the scores of burnout of physicians, and a study that used an invalidated, self-developed instrument to measure burnout. A flow chart is provided in Fig. 1.

None survey concerning physicians' burnout was found before 2008, but afterwards, we identified 15 studies assessing the levels of burnout among physicians. An overview of these studies is shown in Table 1. The sample sizes of physicians in these surveys were in the range from 101 to 4,594. Among all, 4 surveys included both physicians and other types of health care workers. For these studies, we excluded non-physician participants, resulting sample sizes ranging from 27 to 101. Among all 15 studies, six of them used the MBI, including the MBI-HSS and Maslach Burnout Inventory-General Survey (MBI-GS). However, different items from each of three dimensions were used to measure physicians' burnout: emotional exhaustion (5–9 items), depersonalization (4 or 5 items) and reduced personal accomplishment (7–9 items). For scoring, two of these surveys used a 5-point Likert scale, while others used a 7-point Likert scale. Only one survey categorized burnout level into low, moderate and high-risk groups based on overall score data.[1]

Another nine surveys used CBI, taking either two or three subscales (personal-related burnout, work-related burnout, client-related burnout) for mea-

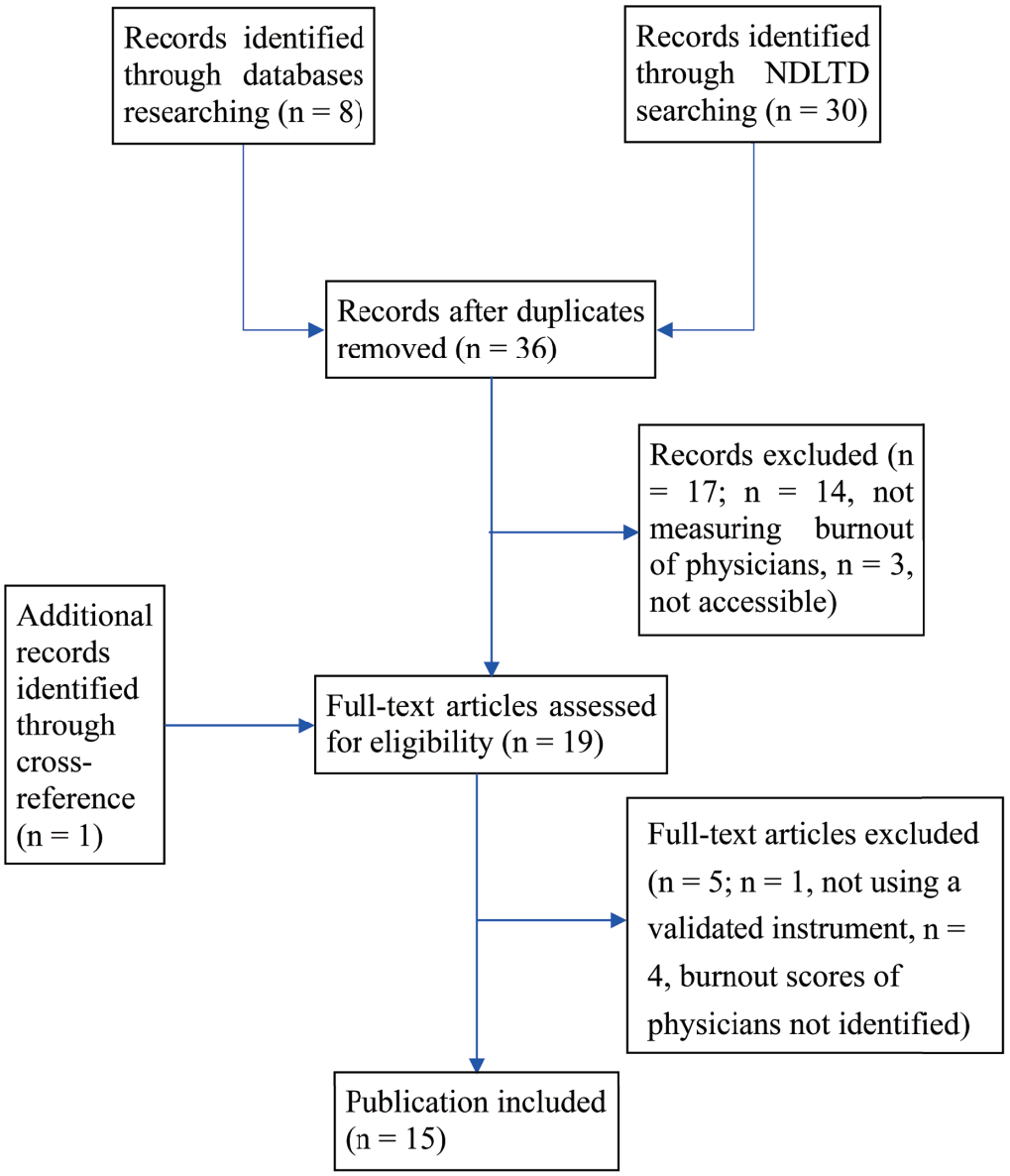

Fig. 1. Selection of surveys.
NDLTD: National Digital Library of Theses and Dissertions.

Table 1. Surveys of burnout among physicians in Taiwan, ranked by year

Author (year)	Study population	Sample size	Instrument	Scores of burnout among physicians	Cronbach's α	Main correlating factors of burnout
Feng (2008)[11]	Internists and surgeons of seven regional teaching hospitals in Southern Taiwan	248	MBI	Male (n = 227): EE = 3.3 ± 0.9; DP = 2.5 ± 0.9; RPA = 2.8 ± 0.7 Female (n = 21): EE = 3.7 ± 1.0; DP = 2.6 ± 0.2; RPA = 3.1 ± 0.2	EE: 0.8 DP: 0.7 RPA: 0.7	Emotional intelligence and empathy were negatively correlated with burnout.
Tsai (2009)[12]	Board-certificated emergency physicians in Taiwan	528	CBI	Work: 57.9 + 18.3 Client: 48.5 + 16.6	0.9 0.9	1. Work-related burnout was positively correlated with turnover intention. 2. Litigation concerns, work-home conflicts and academic responsibilities were significantly associated with burnout.
Wang (2009)[13]	Interns and residents participated in OSCE of a medical center in central Taiwan	126	MBI	EE = 3.9 + 1.1 DP = 4.5 + 1.3 RPA = 3.1 + 1.1	Unrevealed	Burnout level and OSCE scores of physicians are not related.
[a]Lue et al. (2010)[14]	PGY-1 residents in 2006 academic year	555	CBI	Personal: 46.5 ± 20.0 Work: 48.9 ± 18.5 Client: 37.8 ± 15.1	0.9 0.9 0.9	Burnout was positively correlated with stress, neuroticism, negative affectivity, disengagement coping and weekly work hours.
[a]Weng et al. (2011)[15]	Internists and their patients in a regional teaching hospital in Southern Taiwan	110	MBI	EE = 3.4 ± 1.1 DP = 2.6 ± 0.9 RPA = 2.8 ± 0.7	0.8 0.5 0.7	1. Higher self-rated emotional intelligence was associated with less burnout and higher job satisfaction. 2. Higher patient satisfaction was correlated with less burnout. 3. Less burnout was associated with higer job satisfaction.
Huang (2011)[16]	Physicians of diffenrent working teams in regional hospitals and medical centers	526	MBI-HSS	EE = 3.6 ± 0.6 DP = 3.9 ± 0.6 RPA = 4.1 ± 0.5	Unrevealed	Team climate and emotional labor were associated with burnout.
[b]Wong (2011)[17]	Employees of a public hospital in central Taiwan	55	CBI	Personal: 48.1 ± 14.9 Work: 42.6 ± 17.3 Client: 39.4 ± 14.11	0.8 0.9 0.9	For personal burnout: nurses > physicians

Table 1. Surveys of burnout among physicians in Taiwan, ranked by year (Continued)

Author (year)	Study population	Sample size	Instrument	Scores of burnout among physicians	Cronbach's α	Main correlating factors of burnout
[b]Li (2012)[18]	Employees of a medical system in central Taiwan	96	CBI	Personal: 57.0 ± 22.9 Work: 51.1 ± 18.2	0.9	For personal and work-related burnout: nurses, physicians > technicians, administrative staff, research staff, and others.
Tang (2012)[19]	Physicians of a regional teaching hospital in Chiayi	99	CBI	Personal: 49.3 ± 17.9 Work: 40.3 ± 17.7 Client: 34.2 ± 17.6	0.9 0.9 0.9	1. Physicians who were in servise training and had longer work hours had higher personal burnout. 2. Physicians with less work experiences had more work-related burnout. 3. Physicians who held a faculty position and who had a graduate degree had less client-related burnout.
Kuo (2013)[20]	Physicians of a medical center and a religious hospital in Northern Taiwan	348	CBI	Work: 50.8 Client: 42.6	0.8	1. Burnout was positively associated with workloads (night shifts per month, average number of inpatients per day, average number of outpatients per week, average working hours per week, number of calls during night shifts). 2. Burnout and experiences of medical malpractice was not related.
[a]Chen et al. (2013)[1]	Physicians of emergency medicine, surgery, obstetrics and gynecology, pediatrics and Taiwan Stroke Association, and physicians of two medical centers, three metropolotan hospitals and two community hospitals	839	MBI	Low: EE = 100.8; DP = 117.2; RPA = 1.5 Moderate: EE = 74.2; DP = 65.5; RPA = 99.3 High: EE = 26.4; DP = 18.7; RPA = 100.5 (per 10,000 physicians)	Unrevealed	1. Incidence of burnout and malpractice experiences were both high among Taiwanese physicians. 2. Physicians who had malpractice experiences and those who were not satisfied with physician-patient relationships had higher-level of burnout.

Table 1. Surveys of burnout among physicians in Taiwan, ranked by year (Continued)

Author (year)	Study population	Sample size	Instrument	Scores of burnout among physicians	Cronbach's α	Main correlating factors of burnout
Chen (2014)[21]	Physicians of a regional hospitals, a psychiatric hospital and a local hospital in Nantou	101	CBI	Personal: unknown Work: 40.0 ± 15.4 Client : 35.7 ± 12.7	0.9 0.9 0.9	1. Physicians with higher work-related burnout had poorer physical and mental health in the coming year. 2. Physicians with more client-related burnout had poorer quality of work performance in the coming year.
[b]Leu (2014)[22]	Employees of a medical center in Taipei	27	MBI-GS	EE = 2.0 DP = 2.3 RPA = 2.5	0.9 0.8 0.9	For job burnout: nurses, technicians > physicians, administrative staff.
[a,b]Chou et al. (2014)[23]	Medical professionals in a regional teaching hospital	101	CBI	Personal: 43.3 ± 18.6 Work: 41.5 ± 19.0 Client: 38.6 ± 16.7	0.9 0.9 0.9	1. For work-related burnout: nurses > physician assistants > physicians > administrative staff > medical technicians. 2. Job strain, over-commitment and low social support explained the most variance of burnout (all professions).
Lee and Hu (2014)[24]	Members of Taiwan Medical Association	4,594	CBI	Personal: 46.0 ± 24.7 Work: 39.9 ± 23.6 Client: 35.4 ± 21.3	Unrevealed	1. Female physicians had higher burnout in all three subscales. 2. Both age and working hours had a negative correlation with level of burnout. 3. Resident physicians had higher burnout than attending physicians.

CBI: Copenhagen Burnout Inventory; DP: depersonalization; EE: emotional exhaustion; MBI: Maslach Burnout Inventory; MBI-HSS: MBI-GS: Maslach Burnout Inventory-General Survey; Maslach Burnout Inventory-Human Services Survey; OSCE: objective structured clinical examination; PGY-1: first postgraduate year; RPA: reduced personal accomplishment.
[a]Published article.
[b]Cross-professional survey.

surement, and all of the scores were transformed into a 100-point scale. The reliability of burnout inventories used in most of these 15 surveys were above acceptable levels, with Cronbach's α values in the range of 0.7 and 0.9. However, the results of a survey indicated that the Cronbach's α value of the depersonalization dimension of MBI was 0.5.[15] For surveys that used CBI, the average burnout scores were shown in Fig. 2.

The relationship between socio-demographic characteristics and burnout are summarized in Table 2. Four surveys showed that female physicians had higher MBI scores in both emotional exhaustion and reduced personal accomplishment, and in all of the three CBI scales, i.e., work-related, personal-related and client-related burnout than male physcians.[11,14,21,24] However, another three studies found no gender differences in burnout.[1,12,13] All of the seven surveys which had examined age differences of burnout showed that younger physicians had higher levels of burnout than their older counterparts.[11,12,16,18,21,24] Among them, three surveys further reported a negative correlation between years of work experience and the levels of burnout.[12,16,19] The relationship between marital status, subspecialty and burnout were inconsistent. One survey found that married physicians had higher emotional exhaustion,[1] but another found married physicians with children had lower work-related and client-related burnout than other groups.[12] Two surveys found surgeons had lower level of depersonalization and work-related burnout than physicians of other specialties,[11,21] on the contrary, another survey found that surgeons had higher levels of depersonalization than physicians of other specialties.[16] Results from a study showed that physicians with an administrative position had lower levels of reduced personal accomplishment,[11] and those with a faculty position and a graduate degree had lower levels of client-related burnout.[19] For physicians who were on in-service training, their personal burnout was found to be higher[19] than other physicians in one study, while no difference in another study.[12] In addition, a study reported that first-year residents had higher burnout than second-year residents,[13] and some other studies indicated that residents were more burned-out than attending physicians.[16,24]

In terms of work content, average working hours per month or per week had a positive correlation with work-related burnout.[12,20,24] Physicians who worked 13–17 hrs continuously had higher levels of emotion-

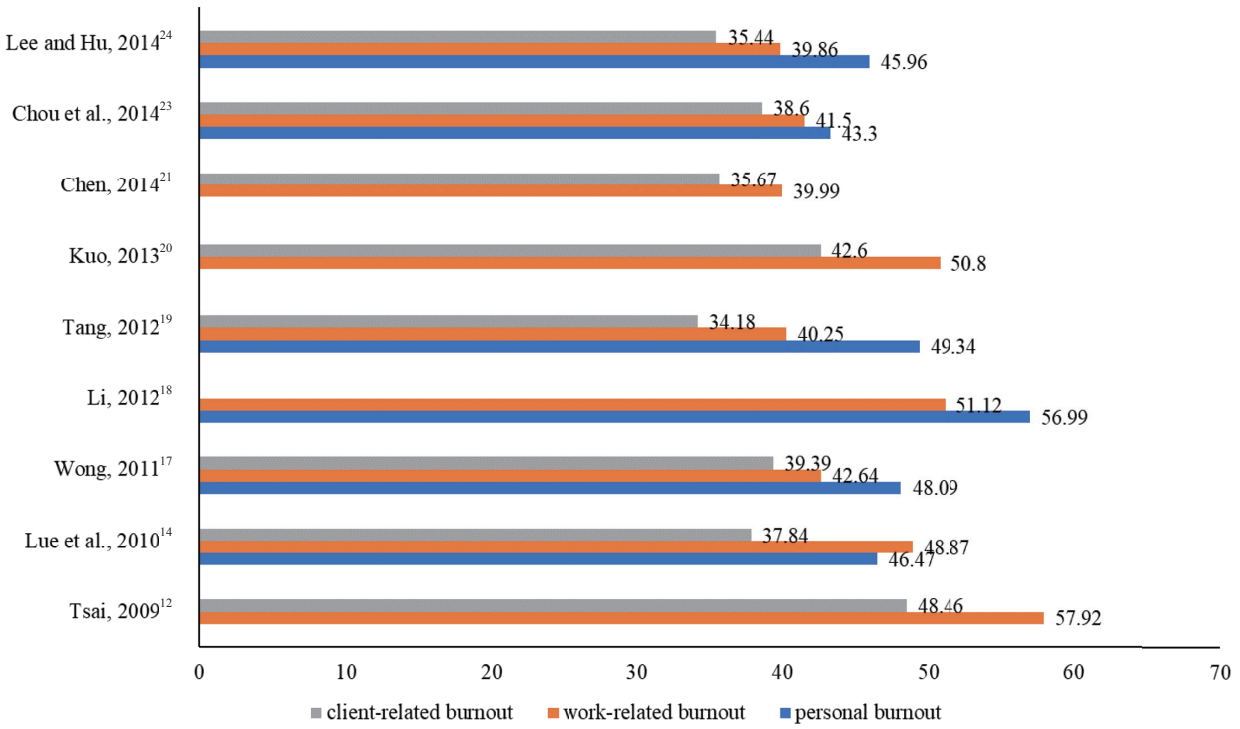

Fig. 2. Scores of personal burnout, work-related burnout and client-related burnout among physicians by survey, ranked by year.

Table 2. Relationship between socio-demographic characteristics and burnout

	Feng (2008)[11]	Tsai (2009)[12]	Wang (2009)[13]	Lue et al. (2010)[14]	Huang (2011)[16]	Li (2012)[18]	Tang (2012)[19]	Kuo (2013)[20]	Chen et al. (2013)[1]	Chen (2014)[21]	Lee and Hu (2014)[24]
Gender	female	NS	NS						NS	female	female
Age	younger	younger			younger	younger			younger	younger	younger
Marital status		unmarried							married		
Education					−		−				
Job position			R1 > R2		R > VS						R > VS
Subspecialty	surgeon > non-surgeon				non-surgeon > surgeon					surgeon > non-surgeon	
Work experiences		−			−		−				
Administrative position	−										
Faculty							−				
In-service training		NS					+				
Working hours		+					+	+	+		+
Workloads								+	+		
Night shifts		+						+			
Practice location		Southern Taiwan							metropolitan area		
Institutional accreditation level		medical center	regional hospital						medical center		

NS: means not statistically significant; R: residents; R1: first-year resident; R2: second-year resident; VS: visiting staff or attending physicians.
+positive associations with burnout.
−negative associations with burnout.

al exhaustion compared to those with 3–7 continuous working hours,[1] and those who had ever worked 17–24 hrs continuously had higher levels of personal burnout than those had not.[19] Average outpatient numbers per week, average inpatient number per day, and average time of being called during night shifts were all found to be positively correlated with both work-related and client-related burnout.[20] Physicians with more than 41 times of being on call per week had higher levels of emotional exhaustion and depersonalization than those below.[1] The frequency of night shifts was also found to correlate with higher levels of work-related or client-related burnout.[12,20] Besides, physicians who worked in medical centers had higher risks of emotional exhaustion, depersonalization, and work-related burnout.[1,12] Some studies also indicated that physicians working in the southern part of Taiwan had higher client-related burnout that those in other regions,[12] and those in metropolitan areas had higher risks of reduced personal accomplishment than those in non-metropolitan areas.[1]

The associations of other psychosocial work hazards were examined in several studies, including emotional work demands, work-home conflicts, team climate, malpractice concerns, and academic responsibilities; all of which had been found to contribute to psychological job demands of physicians.[12,13,16] Some studies reported relationships between burnout and personal characteristics or attitudes of physicians, such as emotional intelligence, empathy, personality, job satisfaction, medical malpractice experiences and satisfaction with physician-patient relationship.[1,14,15] As to the outcome of burnout, several studies also reported that turnover intention, patient satisfaction, self-predicted physical health, mental health and quality of work performance in the coming year were associated with burnout of physicians.[12,15,21]

Discussion

Burnout has been a well-established academic subject, on which thousands of publications have appeared since the 1980s. However, in Taiwan, physicians' burnout has not been studied until 2008. The surveys we identified were mostly unpublished master theses with insufficient numbers of study participants, except a national survey sponsored by the Ministry of Labor.[24] The sites of these surveys scattered across different regions of Taiwan, and half of them were restricted within a single health care organization. All of these surveys were cross-sectional studies using either the Chinese version of MBI or the Chinese version of CBI to measure physicians' burnout.

For those which used the MBI, different editions were used including MBI-HSS and MBI-GS. Although all these editions consist of three dimensions, these studies used different sets of items and even different scales to record responses, making cross-study comparisons difficult. Only one survey had categorized the overall score data, as commonly performed in most of the MBI-oriented studies from other countries.

On the other hand, all surveys that used the CBI presented transformed scores based on a 100-point scale, making comparison across these studies feasible. In these surveys, the scores of personal burnout ranged from 43.3 to 57.0, work-related burnout from 39.9 to 57.9, and client-related burnout from 34.2 to 48.5. Because the CBI had been used in national workplace surveys, a comparison between physcians and general workers is also possible. For the general workers in Taiwan, the average burnout scores of personal burnout were 33.9 for men and 36.6 for women, and the average scores of work-related burnout were 27.9 for men and 29.2 for women.[25] These findings suggested that physicians have higher levels of burnout than general working people in Taiwan. Similar findings were found in the U.S.[2]

We reviewed existing literature from other countries, and found two studies using the CBI to measure physicians' burnout. One was conducted by Danish researchers among physicians of 57 hospitals, which reported average scores of personal burnout of 36.6, work-related burnout of 39.8, and client-related burnout of 26.7.[26] In another study among 1,487 senior doctors and dentists in public hospitals of New Zealand, personal, work-related and client-related burnout scores were 47.6, 44.5 and 29.4, respectively.[27] Although the distribution of the CBI scores was not available, most of the surveys we reviewed showed an average score of personal and work-related burnout in the range of 40 and 50 points. Taken into consideration that a CBI burnout score of 50 above is considered as having high burnout, our findings suggested that the severity of job burnout among physicians in Taiwan may be of significance.

It can be noticed that the client-related burnout scores in the Danish study and the New Zealand's study were both lower than 30, while in allof the surveys of physcians in Taiwan showed average scores

of client-related burnout higher than 30. We suspect that higher client-related buroutout among physicians in Taiwan may result from a more straining physician-patient social interaction in Taiwan. It could also be explained by a wider scope of clients defined in the health care settings of Taiwan than in western societies, given a stronger family tie in Asian cultures in which physcians have to interact intensivly not only with patients but also their family members. Further investigation is needed to explore the nature, sources and potential cultural differences of client-related burnout among physicians.

The associations of demographic factors with physicians' burnout have been inconsistent. Some recent studies from other countries suggested that younger physicians have higher incidence of burnout than older colleagues,[27,28] and seven surveys in our review agreed with it.[1,11,12,16,18,21,24] There are several possible explanations. First, selection effect is possible, with those mostly affected by burnout having taken early leave or retirement. Secondly, those who remain in employment might have either been selected on the basis of their resilience or have developed coping strategies over the course of their career. For example, more effective task-oriented coping might be associated with decreased risk of burnout, while passive emotion-oriented coping might be associated with increased risk of burnout.[29]

Among all the studies we reviewed, a study focusing on residents indicated that residents in the first post-graduate year had rather high levels of work-related and client-related burnout.[14] Another two surveys also found that residents were more burned-out than attending physicians.[16,24] These findings are in agreement with international literature, which has pointed out that the onset of burnout may be as early as residence training. Physicians' burnout may occur in up to 75% of trainees across multiple displines, but this problem has been largely underestimated by program directors.[4,30,31] Once present, burnout can persist throughout residency, although a trend toward decreased burnout has been noticed as residents progressed through training.[32,33] The fact that resident physicians are at high-risk for developing burnout may be explained by long work hours, high stress levels, sleep deprivation, and lack of leisure time. Therefore, we suggest that residents in their first postgraduate year should be targeted for the screening and intervention of burnout problems. Besides, long-term follow-up evaluation should be established and residency curricula should be provided to better assist residents develop effective coping strategies for burnout.

There are conflicting findings concerning the role of of gender on physicians' burnout. A recent study from the U.S. found that female physicians had significantly higher personal burnout scores than their male counterpart.[34] A French study of emergency physicians found that work-family conflict was the primary risk factor for burnout among female physicians, whereas quality of team work ranked as the most important risk factor for burnout among male physicians.[35] Analysis of some qualitative comments of female physicians in New Zealand found that women were more likely to cite issues associated with having young children in their comments, suggesting a greater extent of work-family conflict as a contributing factor to female physicians' burnout.[27] Future research will be needed to understand the nature of gender differences in work conditions, family care loads, work-home conflict, work-time arrangement and gender-based discrimination as well as their impacts on female physicians' burnout.

There is only one survey in our review which focused on physicians within a single subspecialty, that is, emergency medicine physicians.[12] It was a multicenter and nationwide study conducted in 2009, and it showed the highest average scores both in work-related and client-related burnout among all the surveys that used CBI. Moreover, burnout was found to have a strong correlation with turnover intention of emergency physicians. It concured with the conclusion of surveys later conducted in the North America, Canada, Frence and New Zealand. The study from the North America indicated that more than 60% of emergency physicians had moderate to high burnout scores, and it had worsened from 2011 to 2014. Some studies further indicated that emergency physicians' burnout and the declining job satisfaction were strongly associated with actual reductions in professional work efforts over the following 24 months.[2,5,27,35-37] Given the strong connection noted in the literature between burnout, patient outcomes and the likelihood of staff turnover, there is an urgent need to conduct serial studies at a national level to assess burnout level, its trends and contributing factors among emergency physicians whom are known to be one of the most susceptible specialties to burnout. Notably, two surveys in our review found significant correlations between malpractice experiences and litigation con-

cerns with physicians' burnout.[1,12] The relationships between medical malpractice concerns and burnout warrant further research.

Consistent with international literature, some surveys in our review found that weekly working hours (≥ 50 hrs/week), consecutive working hours and the frequencies of being on call per week were positively associated with physicians' burnout.[1,20,27,38] One survey which assessed physicians' workloads by patient volume and frequencies of being called during night shifts also indicated that both indicators were positively correlated with burnout.[20] To objectively evaluate physicians' workloads, researchers should take notice of work contents in all aspects, including both clinical services and non-clinical services such as administrative duties and academic responsibilities. The latter include bed-side teaching, research demands, admininstrative requirements for documentation and quality measures, public health services imposed by governmental policies, as well as social scrutiny by patient-right advocacy groups. Because that medical centers are expected to play multiple roles and to fulfill multiple responsibilities, it is not a surprise that physicians in medical centers were found to have higher burnout levels, as noted in some surveys.[1,12]

In our review, four surveys found that nurses and other medical professionals were more burned-out than physicians, which deserves further research.[17,18,22,23]

There were some limitations in the surveys we reviewed. First, some studies were based on single-centered study populations, which limited the generalizability of their findings. To fully understand the pattern of physicians' burnout, we recommend future research in this area to be multicenter and multilevel, including participants from all levels of health care facilities. Secondly, none of the survey in our review was longitudinal nor was experiemental. Yet there have been increasing intervention studies fron other countries concerning physcians' burnout. For instance, one recent meta-analysis noted that individual (e.g., mindfulness, discussion, and stress management) and organizational (e.g., work environment) interventions produced similarly large reductions in physicians' burnout; while another study suggested significantly improved effects of ogranization-focused interventions when compared with physician-focused interventions.[39,40] While findings were still diverse, all of these interventions took initiatives in acknowledging the existance and enhancing social awareness of physicians' burnout problems, way before it becomes unmanageable. Just as individual physicians can be more mindful of their levels of burnout, health care organizations can take steps to monitor these levels as quality indicators and to disseminate findings to raise collective awareness with regards to the pervasive problems as well as the contributing factors of physicians' burnout.

Conclusion

In conclusion, our review indicated that burnout of physicians is of significance in Taiwan, especially in some susceptible age groups and subspecialties. Future research with longitudinal and multicenter study designs is needed to comprehend the problems and the trends of physicians' burnout. Experimental studies are also needed to assess the effectiveness of interventions designed to reduce physicians' burnout. Furthermore, we call on the labor and health authorities to pay attention to this issue and to take actions on a timely manner, as physicians' burnout is important not only to physicians' own wellbeing but also to the functions and sustainability of the health care systems.

Conflicts of Interest Statement

None declared.

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None declared.

References

1. Chen KY, Yang CM, Lien CH, et al. Burnout, job satisfaction, and medical malpractice among physicians. *Int J Med Sci* 2013;10:1471-1478. doi:10.7150/ijms.6743
2. Shanafelt TD, Hasan O, Dyrbye LN, et al. Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. *Mayo Clin Proc* 2015;90:1600-1613. doi:10.1016/j.mayocp.2015.08.023
3. Rothenberger DA. Physician burnout and well-being: a systematic review and framework for action. *Dis Colon Rectum* 2017;60:567-576. doi:10.1097/DCR.0000000000000844
4. Baer TE, Feraco AM, Tuysuzoglu Sagalowsky S, Williams D, Litman HJ, Vinci RJ. Pediatric resident burnout and attitudes toward patients. *Pediatrics* 2017;e20162163.

doi:10.1542/peds.2016-2163
5. Lu DW, Dresden S, McCloskey C, Branzetti J, Gisondi MA. Impact of burnout on self-reported patient care among emergency physicians. *West J Emerg Med* 2015;16:996-1001. doi:10.5811/westjem.2015.9.27945
6. Schaufeli WB, Maslach C, Marek T. *Professional Burnout: Recent Developments in Theory and Research*. Washington, DC: Taylor & Francis; 2017. doi:10.1016/S0965-2302(97)90071-0
7. Loera B, Converso D, Viotti S. Evaluating the psychometric properties of the Maslach Burnout Inventory-Human Services Survey (MBI-HSS) among italian nurses: how many factors must a researcher consider? *PLoS One* 2014;9:e114987. doi:10.1371/journal.pone.0114987
8. Maslach C, Jackson SE. Leiter MP. *Maslach Burnout Inventory Manual*. Palo Alto, CA: Consulting Psychological Press; 1996.
9. Kristensen TS, Borritz M, Villadsen E, Christensen KB. The Copenhagen burnout inventory: a new tool for the assessment of burnout. *Work & Stress* 2005;19:192-207. doi:10.1080/02678370500297720
10. Yeh WY, Cheng Y, Chen CJ, Hu PY, Kristensen TS. Psychometric properties of the Chinese version of Copenhagen burnout inventory among employees in two companies in Taiwan. *Int J Behav Med* 2007;14:126-133. doi:10.1007/BF03000183
11. Feng JH. E*xploring the Associations among Emotional Intelligence, Emotional Labor and Burnout for Physicians* [master's thesis]. Kaohsiung: I-Shou University; 2008.
12. Tsai YL. *On Emergency Physician Burnout and Its Impaction on Turnouver Intention* [master's thesis]. Taipei: National Taiwan University; 2009. doi:10.6342/NTU.2009.00243
13. Wang CY. *Relationships among Job Burnout, Emotional Labor, and Objective Structured Clinical Examination of Interns and Residents in a Medical Center of Central Taiwan* [master's thesis]. Taichung: China Medical University; 2009.
14. Lue BH, Chen HJ, Wang CW, Cheng Y, Chen MC. Stress, personal characteristics and burnout among first postgraduate year residents: a nationwide study in Taiwan. *Med Teach* 2010;32:400-407. doi:10.3109/01421590903437188
15. Weng HC, Hung CM, Liu YT, et al. Associations between emotional intelligence and doctor burnout, job satisfaction and patient satisfaction. *Med Educ* 2011;45:835-842. doi:10.1111/j.1365-2923.2011.03985.x
16. Huang YW. *A Multi-Level Research of Physician's Job Burnout* [master's thesis]. Hsinchu: Yuanpei University of Medical Technology; 2011.
17. Wong YT. *A Study of Occupational Burnout Assessement among Workers in a Public Hospital* [master's thesis]. Taichung: Central Taiwan University of Science and Technology; 2011.
18. Li MF. *A Field Study of Burnout and Job Stress for Employees in a Medical System in Central Taiwan* [master's thesis]. Taichung: Hungkuang University; 2012.
19. Tang HL. *The Study of Burnout in Physician—Taking a Chiayi Area Regional Teaching Hospital as a Case Study* [master's thesis]. Yunlin: National Yunlin University of Science and Technology; 2012.
20. Kuo IJ. *Elucidating the Relationships between Job Strains and Burnout, Depression, Career Satisfaction, Medical Dispute among Doctors* [master's thesis]. Taipei: National Taiwan University; 2013. doi:10.6342/NTU.2013.00126
21. Chen CY. *The Study on Physician Burnout Types and Possible Subsequent Effects in Nantou Hospitals* [master's thesis]. Taichung: Asia University; 2014.
22. Leu BS. *A Study of Medical Staffs on Job Satisfaction, Job Burnout and Intention to Stay* [master's thesis]. Taoyuan: Lunghwa University of Science and Technology; 2014.
23. Chou LP, Li CY, Hu SC. Job stress and burnout in hospital employees: comparisons of different medical professions in a regional hospital in Taiwan. *BMJ Open* 2014;4:e004185. doi:10.1136/bmjopen-2013-004185
24. Lee MB, Hu PY. *Assessment of Job Stress Risk Factors of Physicians in Taiwan*. Taipei: Institute of Labor, Occupational Safety and Health, Ministry of Labor; 2014.
25. Chang YJ, Yeh WY, Chen CW, Chen CJ, Shih SS, Cheng YW. Distribution and correlates of burnout among paid employees in Taiwan. *Taiwan J Public Health* 2007;26:75-87. doi:10.6288/TJPH2007-26-01-09
26. Borritz M, Rugulies R, Bjorner JB, Villadsen E, Mikkelsen OA, Kristensen TS. Burnout among employees in human service work: design and baseline findings of the PUMA study. *Scand J Public Health* 2006;34:49-58. doi:10.1080/14034940510032275
27. Chambers CN, Frampton CM, Barclay M, McKee M. Burnout prevalence in New Zealand's public hospital senior medical workforce: a cross-sectional mixed methods study. *BMJ Open* 2016;6:e013947. doi:10.1136/bmjopen-2016-013947
28. Kamal AH, Bull JH, Wolf SP, et al. Prevalence and predictors of burnout among hospice and palliative care clinicians in the U.S. *J Pain Symptom Manage* 2016;51:690-696. doi:10.1016/j.jpainsymman.2015.10.020
29. Howlett M, Doody K, Murray J, LeBlanc-Duchin D, Fraser J, Atkinson PR. Burnout in emergency department healthcare professionals is associated with coping style: a cross-sectional survey. *Emerg Med J* 2015;32:722-727. doi:10.1136/emermed-2014-203750
30. Connolly A, Holmes E, Clark L, Denniston C, Meltzer-Brody S. Resident physician burnout: creating an institutional system to detect, identify, and mitigate

symptoms. *Obstet Gynecol* 2015;126:51S. doi:10.1097/01.AOG.0000471088.87912.fa

31. Holmes EG, Connolly A, Putnam KT, et al. Taking care of our own: a multispecialty study of resident and program director perspectives on contributors to burnout and potential interventions. *Acad Psychiatry* 2017;41:159-166. doi:10.1007/s40596-016-0590-3
32. Campbell J, Prochazka AV, Yamashita T, Gopal R. Predictors of persistent burnout in internal medicine residents: a prospective cohort study. *Acad Med* 2010;85:1630-1634. doi:10.1097/ACM.0b013e3181f0c4e7
33. Pantaleoni JL, Augustine EM, Sourkes BM, Bachrach LK. Burnout in pediatric residents over a 2-year period: a longitudinal study. *Acad Pediatr* 2014;14:167-172. doi:10.1016/j.acap.2013.12.001
34. Parr JM, Pinto N, Hanson M, Meehan A, Moore PT. Medical graduates, tertiary hospitals, and burnout: a longitudinal cohort study. *Ochsner J* 2016;16:22-26.
35. Estryn-Behar M, Doppia MA, Guetarni K, et al. Emergency physicians accumulate more stress factors than other physicians—results from the French SESMAT study. *Emerg Med J* 2011;28:397-410. doi:10.1136/emj.2009.082594
36. Arora M, Asha S, Chinnappa J, Diwan AD. Review article: burnout in emergency medicine physicians. *Emerg Med Australas* 2013;25:491-495. doi:10.1111/1742-6723.12135
37. Shanafelt TD, Mungo M, Schmitgen J, et al. Longitudinal study evaluating the association between physician burnout and changes in professional work effort. *Mayo Clin Proc* 2016;91:422-431. doi:10.1016/j.mayocp.2016.02.001
38. Lee RT, Seo B, Hladkyj S, Lovell BL, Schwartzmann L. Correlates of physician burnout across regions and specialties: a meta-analysis. *Hum Resour Health* 2013;11:48. doi:10.1186/1478-4491-11-48
39. West CP, Dyrbye LN, Erwin PJ, Shanafelt TD. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. *Lancet* 2016;388:2272-2281. doi:10.1016/S0140-6736(16)31279-X
40. Panagioti M, Panagopoulou E, Bower P, et al. Controlled interventions to reduce burnout in physicians: a systematic review and meta-analysis. *JAMA Intern Med* 2017;177:195-205. doi:10.1001/jamainternmed.2016.7674