Psychological Morbidity, Quality of Life and their Correlations among Military Health Care Workers in Taiwan

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Abstract: To estimate the prevalence of psychological morbidity among health care workers in military hospitals in Taiwan and studies the association between psychological morbidity and quality of life. We sent surveys to 1,269 health care workers working in military hospitals. Participants completed structured questionnaires that included the General Health Questionnaire (GHQ), and the WHO Quality of Life Questionnaire (WHO-QOL). The survey was completed by 65 physicians, 416 nurses, and 304 other specialists. Nurses had the highest GHQ scores (nurses 32.1% vs. physicians 28.3% and other 22.4%). On the WHOQOL, nurses had worse psychological and environment domain scores (12.7 and 13.1, respectively) and physicians scored the worst for the physical and social domain as compared to nurses and other specialists. The younger, hypnotic drug use and life events had higher percentage in psychological morbidity group (Odds Ratio 1.04, 12.5, 2.38; $p=0.008$, 0.028 and 0.014, respectively). In regression analysis, job category, life event and hypnotic drug use could predict GHQ; age and GHQ could predict QOL ($p<0.001$). The GHQ might be a mediating factor to QOL. Programs should be developed to educate younger health care workers with psychological morbidity to adjust the stressors associated with their jobs to improve their QOL.

Key words: GHQ, Health care worker, Psychological morbidity, WHOQOL

Introduction

Although the United Nations International Labor Office has referred to job stress as “a twentieth-century disease” (1992 United Nations Report on Job Stress), high quality mental health care is limited in many countries. Commonplace anxiety and depressive disorders are a

great cause of absenteeism at work and costly to both employees and employers alike¹⁾. The prevalence of psychological morbidity in the general and working population, as assessed using the General Health Questionnaire (GHQ), a generally accepted measure of stress and mental health in occupational studies, ranges between 9% and 24% in men and between 21% and 33.3% in women^{2–9)}.

Quality of life, as defined by the WHOQOL group in 1995, is the “individuals’ perceptions of their position in life in the context of the culture and value systems in

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which they live and in relation to their goals, expectations, standards, and concerns. It is a broad-ranging concept, incorporating the persons' physical health, psychological state, level of independence, social relationships, and personal beliefs, and their relationship to salient features of the environment". There are few epidemiological studies on the quality of life of health care workers in hospitals, where certain stressors influencing quality of life can be found. These stressors included low autonomy, limited involvement in decision-making, noisy and hot environments, heavy physical load, long work hours, work shifts, exposure to toxins and infectious agents or patients¹⁰⁻¹⁴). Situations pertaining to the physical workload, death of a patient, and communication problems with physicians and nursing administrators have been ranked most highly stressful¹⁵). Among military health care workers, the four most common reported factors influencing job stress have been reported to be the lack of support from supervisors, high responsibility, long working hours, and task overload¹⁶).

In military hospitals in Taiwan, health care workers are asked to intervene in sudden disasters and crisis situations, such as in the case of the SARS epidemic in February 2003, when military hospitals took charge of the overflow of cases¹⁵). Another source of stress in Taiwan's military hospitals is the government's downsizing of a number of military general hospitals. For example, the Air Force's Pingtung Hospital was merged with its hospital in Kaohsiung and Navy's Penghu Hospital was merged with Tri-service General Hospital in July 2006. The policy of downsizing and layoff would change working circumstances. It would be reasonable to assume that these stressful events can influence the mental health status and quality of life for health care workers in Taiwan's military hospitals, though we do not know to what extent this occurs.

This study uses the GHQ and WHOQOL-BREF to estimate the prevalence of psychological morbidity among 785 health care workers in three military general hospitals in southern Taiwan between November and December 2005 and to explore the relationship between psychological morbidity and quality of life factors in these work environments.

Methods

A cross-sectional survey was undertaken between November and December 2005. The study follows the guidelines outlined in the Helsinki declaration and the design was approved by the institutional review board of Taiwan Armed Forces Kaohsiung General Hospital. Purposive sampling was done to recruit study subjects from three southern Taiwan military hospitals. We used

sample size determination in health studies, version 2.0 (World Health Organization), selected the 95% confidence interval, anticipated population prevalence 0.025, population size 50,000, and predicted the parameter of sample size to be 364. Potential subjects were delivered a description of this study, an informed consent form and a structured questionnaire that about personal characteristics, disease history, GHQ-12 (Chinese version) and WHOQOL-BREF (Taiwan brief version). The questionnaire was collected the following day. Subjects were enrolled into this study if they signed the informed consent form and reported no major illnesses.

Participants

Questionnaires were sent to 1,272 health care workers, which we categorized into physicians, nurses and other health care workers (social workers, psychologists, pharmacologists, laboratory workers and executive officers, etc.). We collected anonymous questionnaires from 65 of 173 physicians, 416 of 616 nurses, and 304 of 483 other health care workers. In total, we collected 785 completed questionnaires, leaving us with a response rate of 61.7%.

Instruments

Questionnaires were used to collect each participant's basic information, including gender, age, occupation, educational level, marital status, smoking history, alcohol-drinking, hypnotic drug use, disease history and potentially confounding life events occurring within the previous six months. Such life events included the death of a relative, economic stress, marital status, sentinel events, and malpractice problems with legal implications. Questionnaires also included the question items from the GHQ and the WHOQOL-BREF.

The GHQ is a self-administered screening instrument used to assess psychological morbidity. The four answer choices for each GHQ item were assigned either a score of 0 or 1. "Not at all" and "About as usual" were assigned a score of 0, and "more than usual" and "always" a score of 1. Psychopathology was represented by the total score of all 12 questions. The participants were subdivided into potential cases (≥ 3) and non-cases (≤ 2). This optimum cutoff point provides the best compromise between high sensitivity and a low false-positive rate, based on the Receiver Operating Characteristic curves, with a Cronbach's alpha of 0.79¹⁷).

The WHOQOL is a 26-item revised version of the 100-item WHOQOL designed by the WHO to measure quality of life. The measure, based on a multi-geographical, multi-ethnic background, and cross-cultural perspectives, has been used in studies of medical outcomes and health policy to evaluate QOL. The instrument is used to eval-

uate one's perception of his or her physical, mental, social and environmental well-being over the past four weeks. 7 to 35, 6 to 30, 3 to 15 and 8 to 40 are the minimum and maximum-scores of physical, psychological, social and environmental domains respectively. The higher the score, the higher the QOL. The reliability test between WHOQOL and the original measure ranges from 0.70 to 0.80, with a Cronbach's alpha ranging from 0.70 to 0.77. Pearson correlation coefficient for each question was calculated, and ranged between 0.53 and 0.78. Criteria-related validity explained 60% of the global QOL. The construct validity has been found to explain 73% of the variance¹⁸.

Statistical analysis

The χ^2 test, and one-way ANOVA, were used to examine the differences in the demographic variables and assessed measures among the three groups. Odds Ratio and multivariate regression analysis were used to analyze the relationship between independent variables to outcome measurements of GHQ and QOL. A p -value <0.05 was considered significant. All statistical operations were performed on SPSS 10.0 for Windows software package (SPSS, Chicago, IL).

Results

As can be seen in Table 1, 785 of the 1,272 questionnaires sent to the health care workers from the three hospitals were returned completed. They included questionnaires from 65 physicians, 416 nurses, and 304 other health care workers. There was a higher response rate from nurses and other health care workers (416/616, 67.5% and 304/483, 62.9%, respectively) and lower response rate from physicians (65/173, 37.5%). We had a higher response rate from the two smaller hospitals, Pingtung and Penghu (95% and 82%, respectively) and a lower response rate from the larger one, Kaohsiung (53%). Physicians were predominantly male (98.5%), while the nurses (98.8%) and other health care workers (65.8%) were mostly female ($p<0.001$). The average age of the other health care workers was 38.3 yr, clearly older than the nurses ($p<0.001$). A greater percentage of nurses were unmarried compared to other health care workers ($p=0.05$); physicians had a higher level of education than the other two groups (19.1 vs. nurses 14.3 and other health care workers 14.1 yr), and nurses had higher educational level than other health care workers ($p<0.001$). Other health care workers consumed more alcohol (9.3% vs. nurses 1.3%) ($p<0.001$) and physicians, other health care workers were more likely to be smokers than nurses (13.3% physicians, others 10.4% vs. nurses 1%) ($p<0.001$). A greater proportion of physicians reported

major life events (26.7% vs. nurses 9.5% and other health care workers 7.8%) ($p=0.004$).

Table 1 also compares the total GHQ scores, in which we found psychological morbidity was found to be more common among the nurses (32.1%) than physicians (28.3%) and the other health care workers (22.4%) ($p=0.031$). The average prevalence of psychological morbidity in this study was 27.9%. Comparing the four dimensions of WHOQOL, we found physicians having the worse physical domain scores (14.22) than either the nurses (14.29) or other health care workers (14.91). While the nurses had worse psychological and environment dimension scores (12.70 and 13.13, respectively) than the physicians and other health care workers (13.03, 13.32 and 13.39, 13.56, respectively), so were their social dimension scores. In ANOVA, the nurses had the worse physical, psychological and environmental domains than the other health care workers group ($p=0.002$, 0.002 and 0.044 respectively). In the total scale of QOL, the nurses had the worst QOL than the other health care workers (53.9 ± 7.7 , 54.1 ± 10.3 , 55.7 ± 7.9 , respectively; $p=0.013$).

When we considered the GHQ items separately and analyzed them by worker groups, we found nurses scoring the worst on Item 5 than physicians and other health care workers (0.30 vs. 0.10 and 0.20) ($p=0.001$). For Item 6 and Item 8, we found nurses to have the worse score than other health care workers (0.35 vs. 0.25; 0.15 vs. 0.09 respectively) ($p=0.037$; 0.045 respectively).

We also considered QOL items separately and analyzed them by worker group (Table 3). Items 1 and 2 ask for the participants' general estimation of quality of life and health status. Physicians had the worst scores for these two items (2.98, 3.06) ($p<0.001$, $p=0.016$). For items listed under physical domain, nurses had the worst scores for Item 3 (3.48 vs. 3.76 and 3.92, respectively) than the other health care workers and physicians ($p<0.001$). The nurses had poorer scores for Item 10 than the other health care workers (3.22 vs. 2.98) ($p=0.001$). The physicians had the worse score on Item 17 than the other health care workers (3.36 vs. 3.65) ($p=0.006$). For items listed under psychological domain, nurses had worse scores than the other health care workers on Item 6 (3.24 vs. 3.41) ($p=0.048$), on Item 7 (3.10 vs. 3.26) ($p=0.043$), on Item 11 (3.41 vs. 3.59) ($p=0.021$), and Item 26 (3.19 vs. 3.47) ($p<0.001$). For items listed under environment domain, the nurses had worse scores on Item 8, Item 14, and Item 28 than the other health care workers (3.14 vs. 3.36, 2.82 vs. 3.01, and 3.75 vs. 3.89, respectively) ($p=0.002$, 0.024, 0.028). Physicians had worse scores than the other health care workers on Item 14 (2.67 vs. 3.01) ($p=0.024$).

As shown in Table 4, younger, hypnotic drug use and life events had higher percentage in psychological morbidity group (Odds Ratio 1.04, 12.5, 2.38; $p=0.008$, 0.028

Table 1. Comparison of socio-demographic characteristics, GHQ and QOL scores by category of health care workers (physicians, nurses, and others) using the χ^2 test and one-way ANOVA with post hoc multiple comparison

	Physician (n=65)	Nurse (n=416)	Others (n=304)	χ^2/F	<i>p</i>
	Number (%) or Mean $\pm$ SD	Number (%) or Mean $\pm$ SD	Number (%) or Mean $\pm$ SD		
City					
Pingtung	9 (13.8)	57 (13.7)	67 (22.0)	2.3	0.1
Kaohsiung	53 (81.5)	274 (65.9)	168 (55.3)		
Penghu	3 (4.6)	85 (20.4)	69 (22.7)		
Gender					
Male	64 (98.5)	5 (1.2)	104 (34.2)	314.3	0.000 ^{a, b, c}
Female	1 (1.5)	411 (98.8)	200 (65.8)		
Age (yr)	36.58 $\pm$ 6.24	32.67 $\pm$ 8.07	38.27 $\pm$ 8.74	39.7	0.000 ^{a, c}
Education (yr)	19.09 $\pm$ 0.45	14.34 $\pm$ 1.18	14.07 $\pm$ 2.00	283.7	0.000 ^{a, b, c}
Marriage					
Single	17 (37.8)	141 (45.9)	93 (34.1) ^c	3.1	0.051
Married	28 (62.2)	150 (48.9)	169 (61.9)		
Other	0 (0)	16 (5.2)	11 (4.1)		
Alcohol use					
No	29 (96.7)	300 (98.7)	244 (90.7)	9.8	0.000 ^c
Yes	1 (3.3)	4 (1.3)	25 (9.3)		
Hypnotic drug use					
No	28 (93.3)	302 (98.4)	265 (97.1)	3.3	0.187
Yes	2 (6.7)	5 (1.6)	8 (2.9)		
Major life event					
No	22 (73.3)	276 (90.5)	247 (92.2)	11.0	0.004 ^{a, b}
Yes	8 (26.7)	29 (9.5)	21 (7.8)		
Smoking history					
No	26 (86.7)	303 (99.0)	242 (89.6)	26.5	0.000 ^{a, c}
Yes	4 (13.3)	3 (1.0)	28 (10.4)		
Total GHQ score	1.70 $\pm$ 2.73	2.07 $\pm$ 2.53	1.51 $\pm$ 2.20	4.5	0.014 ^c
Cut off point 2					
≤ 2	33 (71.7)	254 (67.9)	222 (77.6)	3.5	0.031 ^c
≥ 3	13 (28.3)	120 (32.1)	64 (22.4)		
QOL score					
Physical	14.22 $\pm$ 2.81	14.29 $\pm$ 2.08	14.91 $\pm$ 2.47	6.6	0.002 ^c
Psychological	13.03 $\pm$ 3.16	12.70 $\pm$ 2.35	13.39 $\pm$ 2.47	6.1	0.002 ^c
Social relation	13.57 $\pm$ 2.59	13.71 $\pm$ 2.12	13.80 $\pm$ 2.23	0.3	0.752
Environmental	13.32 $\pm$ 2.55	13.13 $\pm$ 2.19	13.56 $\pm$ 2.19	3.2	0.044 ^c

^a: significant statistic in the comparison of physicians vs. nurses.^b: significant statistic in the comparison of physicians vs. other health care workers.^c: significant statistic in the comparison of the other health care workers vs. nurses.

and 0.014, respectively). Those with psychological morbidities had worse scores on physical domain of WHO-QOL (Odds Ratio 0.67; $p < 0.001$). As seen in Table 5, when we used regression analysis to look for the predicting factors of GHQ, we found that the job category of nurse, life event and the hypnotic drug use would be the predicting factors to the GHQ ($B = 0.67, 0.84$, and 1.76 ; $p < 0.001, 0.009$, and 0.007 respectively). When workers

had life events would increase 0.84 GHQ and who used hypnotic drug would increase 1.76 scores of GHQ. We used regression analysis to the dependent variable of total scale of QOL by independent variables in forward stepwise such as total scores of GHQ, age, gender, marriage status, educational level in years, substance use history in alcohol, hypnotics, and smoking, leader position or not, and life event. The total scores of GHQ and age could

Table 2. Comparison of 12-item GHQ scores by category of health care workers (physicians, nurses, and others) using the one-way ANOVA and post-hoc multiple comparison tests

	Physicians	Nurses	Others	F	<i>p</i>
	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD		
1. Been suffering from headaches or pressure in your head	0.15 $\pm$ 0.36	0.22 $\pm$ 0.42	0.17 $\pm$ 0.37	1.9	0.151
2. Had palpitations and worried that you might have heart trouble	0.04 $\pm$ 0.20	0.12 $\pm$ 0.32	0.07 $\pm$ 0.26	2.9	0.052
3. Had discomfort or a feeling of pressure in your chest	0.08 $\pm$ 0.28	0.13 $\pm$ 0.34	0.08 $\pm$ 0.27	2.5	0.081
4. Been suffering from shaking or numbness of your limbs	0.02 $\pm$ 0.14	0.08 $\pm$ 0.28	0.06 $\pm$ 0.24	1.5	0.236
5. Lost much sleep through worry	0.10 $\pm$ 0.31	0.30 $\pm$ 0.46	0.20 $\pm$ 0.40	6.7	0.001 ^{a, c}
6. Been taking things hard	0.29 $\pm$ 0.46	0.35 $\pm$ 0.48	0.25 $\pm$ 0.44	3.3	0.037 ^c
7. Been getting along well with your family or friends	0.06 $\pm$ 0.25	0.07 $\pm$ 0.25	0.05 $\pm$ 0.22	0.6	0.552
8. Been losing confidence in yourself	0.19 $\pm$ 0.39	0.15 $\pm$ 0.36	0.09 $\pm$ 0.29	3.1	0.045 ^c
9. Been feeling nervous and strung-up all the time	0.19 $\pm$ 0.39	0.14 $\pm$ 0.34	0.09 $\pm$ 0.29	2.6	0.073
10. Been feeling hopeful about your future	0.23 $\pm$ 0.42	0.22 $\pm$ 0.42	0.18 $\pm$ 0.38	1.1	0.324
11. Been worried about your family or close friends	0.19 $\pm$ 0.39	0.20 $\pm$ 0.44	0.20 $\pm$ 0.40	0.1	0.970
12. Felt that life is entirely hopeless	0.15 $\pm$ 0.36	0.11 $\pm$ 0.36	0.06 $\pm$ 0.24	2.4	0.087

As per Table 1.

Table 3. Comparison of the WHOQOL-BREF domains scores by category of health care workers (physicians, nurses, and others) using the one-way ANOVA and post-hoc multiple comparison tests

	Physicians	Nurses	Others	F	<i>p</i>
	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD		
1. In general, how would you evaluate your quality of life?	2.98 $\pm$ 0.96	3.06 $\pm$ 0.72	3.31 $\pm$ 0.71	11.1	<0.001 ^{b, c}
2. In general, are you satisfied with your health?	3.06 $\pm$ 0.86	3.09 $\pm$ 0.77	3.26 $\pm$ 0.80	4.1	0.016 ^c
Physical Domain					
3. To what extent do you feel that your pain hinders you in doing what you need to do?	3.92 $\pm$ 0.79	3.48 $\pm$ 1.03	3.76 $\pm$ 0.95	8.8	<0.001 ^{a, c}
10. Do you have enough energy for your daily life?	2.98 $\pm$ 0.96	2.98 $\pm$ 0.79	3.22 $\pm$ 0.89	7.4	0.001 ^c
17. Are you satisfied with your ability to perform routine daily activities?	3.36 $\pm$ 1.01	3.56 $\pm$ 0.73	3.65 $\pm$ 0.66	5.2	0.006 ^b
Psychological Domain					
6. Do you feel your life has meaning?	3.17 $\pm$ 1.17	3.24 $\pm$ 0.91	3.41 $\pm$ 0.95	3.1	0.048 ^c
7. How good is your ability to concentrate?	3.21 $\pm$ 0.97	3.10 $\pm$ 0.82	3.26 $\pm$ 0.87	3.1	0.043 ^c
11. Can you accept your appearance?	3.40 $\pm$ 0.82	3.41 $\pm$ 0.83	3.59 $\pm$ 0.88	3.8	0.021 ^c
26. Do you often have negative feelings?	3.47 $\pm$ 0.86	3.19 $\pm$ 0.79	3.47 $\pm$ 0.75	11.2	<0.001 ^c
Environmental Domain					
8. How safe do you feel in your daily life?	3.12 $\pm$ 0.98	3.14 $\pm$ 0.86	3.36 $\pm$ 0.84	6.1	0.002 ^{b, c}
14. Do you have the opportunity to take leisure time?	2.67 $\pm$ 0.86	2.82 $\pm$ 0.88	3.01 $\pm$ 0.85	3.7	0.024 ^c
28. Are you usually able to get the things you like to eat?	3.66 $\pm$ 0.87	3.75 $\pm$ 0.76	3.89 $\pm$ 0.72	3.6	0.028 ^c

As per Table 1.

Items of 3 and 26 were scored reversely.

predict the total scale of QOL ($B=0.19$, -1.30 ; $p<0.001$, <0.001 respectively). An increase in one year of age would increase the QOL by 0.19, while an increase in the total score of GHQ by one would decrease the total score of QOL by 1.30.

Discussion

In this study, we administered the GHQ and WHO-

QOL-BREF to health care workers in three military hospitals to investigate the relationship between psychological morbidity and quality of life in the military hospital environment. The prevalence of psychological morbidity in the subjects of this study was 27.9%, which is higher than that of the general population, which ranges between 9% and 26%^{2, 5-9, 17, 19-22}. We found nurses to have the worst GHQ scores, we also found job category, life event and hypnotic drug use could predict the GHQ.

Table 4. Comparison of the socio-demographic characteristics and WHOQOL domain scores by psychological morbidities in health care workers

	Psychological morbidity With (≥ 3)	Psychological morbidity Without (≤ 2)	B	p	Odds Ratio	95%CI for Exp (B)	
	N=200 (%)	N=517 (%)				Lower	Upper
Job category				0.257			
Physicians	13 (28.3)	33 (71.8)	0.407	0.561	1.50	0.38	5.93
Nurses	120 (32.1)	254 (67.9)	0.428	0.110	1.53	0.91	2.59
Others	64 (22.4)	222 (77.6)					
Sex			-0.221	0.580	0.80	0.37	1.75
Male	34 (23.3)	112 (76.7)					
Female	163 (29.1)	397 (70.9)					
Age (yr)	34.8 $\pm$ 8.8	35.6 $\pm$ 8.7	0.037	0.008	1.04	1.01	1.07
Education level (yr)	12.7 $\pm$ 1.9	12.5 $\pm$ 2.1	-0.030	0.653	0.97	0.85	1.11
Alcohol drinking	6/162 (3.7)	24/447 (5.4)	-0.010	0.987	0.99	0.31	3.12
Hypnotic drug use	9/162 (5.6)	6/447 (1.3)	-2.551	0.028	0.08	0.01	0.76
Smoking	4/162 (2.5)	31/447 (6.9)	0.779	0.228	2.18	0.61	7.73
Life event	24/162 (14.8)	34/447 (7.6)	-0.866	0.014	0.42	0.21	0.84
WHOQOL							
Physical	13.39 $\pm$ 2.1	15.10 $\pm$ 2.2	-0.405	0.000	0.68	0.57	0.78
Psychological	11.82 $\pm$ 2.5	13.54 $\pm$ 2.3	-0.097	0.212	0.91	0.78	1.06
Social	13.33 $\pm$ 2.2	14.15 $\pm$ 2.1	0.097	0.174	1.10	0.96	1.27
Environment	12.31 $\pm$ 2.2	13.77 $\pm$ 2.1	-0.089	0.288	0.92	1.78	1.08

Parameter coding: job category in others 0, physician 1 and nurse 2; male 1, female 0; no alcohol drinking 1, yes 0; no hypnotic drug use 1, yes 0; no smoking 1, yes 0; no life event 1, yes 0.

Table 5. Regression analysis of predictors for GHQ and QOL

	R	R ²	B	SE	β	95%CI for B		p
						Lower	Upper	
Total GHQ score	0.21	0.05						
Constant			-1.31	0.72		-2.73	0.11	0.069
Job category			0.67	0.19	0.14	0.30	1.03	<0.001
Life event			0.84	0.32	0.11	0.21	1.47	0.009
Hypnotic drug use			1.76	0.65	0.11	0.48	3.03	0.007
Total QOL score	0.46	0.21						
Constant			50.28	1.19		47.96	52.61	<0.001
GHQ			-1.30	0.12	-0.39	-1.53	-1.07	<0.001
Age			0.19	0.03	0.21	0.13	0.26	<0.001

QOL: quality of life; R²: R square; B: unstandardized coefficient; SE: standardized error; β : standardized coefficient; CI: confidence interval.

Nurses had the lowest scores in the psychological and environment domain, the physicians had the lowest scores in the physical and social domain. In general, psychological morbidity was associated with poor QOL in workers in this environment and age, and total scores of GHQ could predict total score of QOL.

Many studies have reported significant gender differences in GHQ scores^{2, 5, 8, 20}. One did not. The study of 6,243 employees of a factory in Helsinki found men

and women to have a similar prevalence of psychological morbidity (24% and 26%, respectively)⁷. Similarly, we found no significant gender difference in psychological morbidity. Gender difference, however, may not be as much a result of gender as the type of work in which these employees are involved. Compared to the general society in which psychological morbidity is reported to be between 9 to 24% in males and between 21% and 33.3% in women, psychological morbidity is more common

among physicians (27 to 52%) than our study^{9, 11, 14, 23–26}. The increase may also be due to the readiness among more highly educated people, in this case physicians, to express their emotions^{3, 27}. While the results of this study may be accurate with regard to increased psychological morbidity for physicians, they may overestimate this measure for men in general. Furthermore, psychological morbidity may be underestimated for women in this study. Women of Han Chinese cultural heritage have been found likely to somatize their emotions and psychological morbidities². They would be less likely to express psychological morbidity on a survey. Another reason is the possibility of healthy worker bias in the nurse group. The turnover rate for nurses in Taiwan has been reported to range from 22 to 28% over the last four years²⁸. Those who have kept on working may have adapted better to the job stress. In the review of previous studies, the prevalence of psychological morbidity in nurses was about 18 to 48.8%^{12, 29–32}; only one report, from Nigeria, showed lower psychological morbidity rates than our nurse group. The higher morbidity rates among nurses reported in other surveys^{13, 15, 29} may be due to specific work situations or due to different methodology in cutoff points of the GHQ. Therefore, this is a study involving healthcare workers, the gender differences in psychological morbidity usually found between the sexes may disappear as a result of the type of work they do.

When considering how participants responded to various items in the GHQ, we found that nurses were more likely to report “loss of sleep” and “taking things hard” while physicians were more likely to report “losing confidence”. Possible reasons for the nurses’ response may be related to rotating work shifts. Nurses attributed their stress to employment status, the care of young children, marital relationships, and susceptibility rooted in personality factors^{15, 33}. For physicians, the discomfort may be related to their status as officers in the military and the need to take on additional military missions. Their loss of confidence may also be related to having to respond to changes in health insurance policies and the rigors involved in preparing their hospital department for the accreditation process. These may be the reasons for the job category of nurses to have the poorest GHQ score and the regression analysis showing the total score of GHQ decreases with increasing total score of the QOL.

The WHOQOL is a subjective evaluation of perceived QOL, meaning that a subject’s mental state and earlier experiences will influence his or her internal experience of QOL. While some questionnaires that measure QOL have been developed for specific diseases^{34, 35}, the WHOQOL is generic and can be used on all people³⁶. In the parsimonious model of regression analysis, we found nurses, life event and hypnotic drug use could predict

GHQ, and GHQ could predict the QOL. The GHQ would be the mediating factor between job category, life event, and hypnotic drug use with QOL. Though the job category, life event, and hypnotic drug use did not influence the QOL directly in comparison to age, they nevertheless did indirectly. Therefore, when we investigate the QOL for health care workers, we might explore the mediating role of GHQ or clarify the mediating role in relation to QOL and other predictors by structural equation modeling and confirmatory factor analysis.

The participants categorized as having psychological morbidities (GHQ $\geq$ 3) in this study had lower scores in physical domains. Participants with psychological morbidities had younger age, a higher prevalence of hypnotic drug use, but a significantly lower prevalence of smoking and slightly lower prevalence of alcohol consumption than those without psychological morbidities. This somewhat surprising finding regarding smoking may be because of the large number of women represented in this study. The prevalence of smoking (0.2%) is low among young women in Taiwan²¹. Sixty percent (120/197) of the participants with psychological morbidities in our study were nurses, almost all women. Therefore, this study presents a demographic picture different from those depicted by Kessler³⁷. The lower smoking rate and higher prevalence of hypnotic drug use in our group of health care workers with psychological morbidities may be a result of selection bias, because gender difference in smoking prevalence and other health care workers in Taiwan presumably have easier access to hypnotic drugs.

Compared to other groups in this study, executive officers, who made up part of the other health care worker group, had a higher prevalence rate of smoking and alcohol consumption, usually indicators of poor quality of life and stress. However, they scored lower on life events and higher job satisfaction, which might protect them against the effects of stress. Another reason that this group had a higher prevalence of smoking and alcohol consumption might have been that there were sex and age differences among the health care worker job categories. In the general domain, physicians and nurses had lower scores than other health care workers with respect to the two general QOL items. Although some studies have found QOL scores to be negatively related to both the presence and the severity of psychopathology^{38, 39}, our study showed that, in the nurse group, the higher the total GHQ score and the lower the psychological domain score, the lower their total WHOQOL score would be. These results provide justification for further investigation into the causal relationship between psychosocial factors and the quality of work life among specific military health care worker job categories.

This study has some limitations. First, our sample size

was small in the physician group and 68 missing data of several variables in the questionnaires, though the total response rate was around 61.7%. They may be doubtful about the confidentiality of returning questionnaire in the military environment. Second, psychological morbidity and QOL were measured using self-report questionnaires, so reporting bias could not be avoided. Third, the cross-sectional design of the study did not allow us to establish causal relationships between psychosocial factors, GHQ and QOL. It needs a follow up study to prove the relationships. Finally, the results based on a sample from military general hospitals in Taiwan, no clear information of work conditions and night shift hours which may not be generalized to other health care workers in the private health care sector or to health care works outside Taiwan.

In conclusion, this study found greater psychological morbidity among health care workers in the military hospitals than in the general population in Taiwan. Because job category, life event and hypnotic drug use could predict psychological morbidity which in turn could be a mediating factor to the total QOL scores, younger health care workers and newly employed nurses may be in need of improved guidance to prevent psychological morbidity and to improve their quality of life.

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