

RESEARCH ARTICLE

Health-related quality of life and happiness within an internal medicine residency training program: a longitudinal follow-up study

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Purpose: While undergoing a hospital residency training program, residents often suffer anxiety and stress. This study aims to evaluate the change in health-related quality of life and happiness among internal medicine residents, and identify prognostic factors. **Methods:** Thirty-eight residents in the Ramathibodi Hospital internal medicine training program completed the World Health Organization Quality of Life-BREF and happiness Measures questionnaires at three time points: commencement, day 100, and the end of the second year of training. Confidence, expectations, anxiety, and general health were rated. Analyses were performed with mixed linear regression. **Results:** Financial problems were reported for 16 residents (42.1%). At baseline, most residents had moderate-to-very high confidence, expectations, and general health but also moderate-to-very high anxiety. The health-related quality of life score was highest in the social domain followed by the environmental, psychological, and physical domains. Their psychological, physical, social, and environmental scores significantly decreased after enrollment. Their happiness and general health scores were significantly reduced after enrollment. The training program duration was negatively associated with all domains. Residents with greater confidence had higher health-related quality of life scores in the physical, psychological, and environmental domains. Moreover, their general health was positively associated with the social and environmental domains. **Conclusion:** A reduction in health-related quality of life and happiness under the internal medicine residency program is reported. High confidence and good physical health may counterbalance the decline in health-related quality of life and happiness.

Key Words: Anxiety; Follow-up studies; Internship and residency; Linear models; Quality of life

INTRODUCTION

Health-related quality of life (HRQOL) is a concept that incorporates physical, psychological, emotional, and social functions, which reflect an individual's perceptions and attitudes [1]. Happiness, which is a general positive mood globally evaluating life satisfaction and HRQOL, is an important aspect of emotional well-being [2]. Residents who have just started a

residency training program are usually under stress during the first 3 months because of the excessive number of critical patients and the restrictive duty hours [3-5]. Findings from a cross-sectional study undertaken in Brazil show that the HRQOL scores of the first-year residents, as assessed by the Medical Outcome Study Short Form 36, were lower than those of second-year residents, especially for the mental component [5]. In addition, in the second or third year of the residency training program, predictors of high HRQOL were satisfaction, sufficient leisure time, and under 30 hours per week spent working in critical care [5]. However, there has never been a longitudinal study of HRQOL and happiness in residents within an internal medicine training program. We therefore conducted

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a cohort study to evaluate the change of HRQOL and happiness of residents after starting their residency training program, and to identify their prognostic factors. Ramathibodi Hospital is one of the largest medical schools in Thailand and has 1,500 beds, 16 divisions under the department of medicine, and 110 teaching staff. The course curriculum is designed for residents in the internal medicine program to gain experience and knowledge. Ward rotation, subspecialty rotation, ward-chief, and elective rotation are assigned for the first-year, second-year, and third-year residents.

METHODS

Materials and subjects

A cohort study was conducted involving 38 residents who had just enrolled in a three-year internal medicine training program at the department of medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand. The study protocol was approved by the hospital's ethics committee and is in accordance with the Helsinki Declaration of 1975 as revised in 2008. Informed consent was obtained before the study was launched. After residents commenced the training program, they often had to manage many changes and psychological problems during the first year, despite already having experience from a few years of medical practicing before the residency program. These problems lessened in the third year of residency. Therefore, this study was designed to assess the HRQOL of the first-year and second-year residents. All participants were asked to complete the self-rating questionnaires at three time points: training program commencement, day 100, and two years after enrollment. Demographic and clinical data were collected from their medical records. The HRQOL has been assessed on the basis of the World Health Organization Quality of Life (WHOQOL)-BREF [6], which is an abbreviated version of the WHOQOL-100. It has acceptable validity, internal consistency, and reliability for use as a brief assessment tool for HRQOL [6,7]. It consists of 26 questions under four domains: physical, psychological, social relationships, and environment [6]. Each question is self-rating using a 5-point Likert scale from 1 to 5; higher scores refer to higher HRQOL. A validated Thai version of the WHOQOL-BREF was used in this study with the World Health Organization's permission. The degree of happiness was assessed by a happiness measures questionnaire, which was developed by Fordyce [8]. In addition, confidence, expectations, anxiety, and general health were also assessed using the Likert scale.

Statistics

Data were described using mean and frequency for continuous and categorical data, respectively. Mixed linear regres-

sion analysis was used to compare HRQOL and happiness scores after enrollment at baseline, day 100, and year 2. Factors including time, confidence, expectations, anxiety, and general health were simultaneously included in the multivariate mixed regression model if their P-values were less than 0.10 in the univariate analysis. All analyses were performed using Stata ver. 12.0 (Stata Co., College Station, TX, USA).

RESULTS

Thirty-eight first-year residents were enrolled in the study. Baseline characteristics are shown (Table 1). Among them, mean age (SD) was 26.8 years (1.1), and most were female (24, 63.4%) and single (34, 89.5%). Financial problems were reported for 16 residents (42.1%). No resident had significant underlying medical conditions. At baseline enrollment, most residents had moderate-to-very high confidence (30, 79.0%) and expectations (34, 89.5%). They also had a moderate-to-

Table 1. Baseline characteristics of subjects (n = 38)

Factor	No. (%)
Sex (male)	
Male	14 (36.6)
Female	26 (8.4)
Marital status	
Single	34 (89.5)
Married	4 (10.5)
Financial problem	
No	22 (57.9)
Present	16 (42.1)
Confidence	
No	2 (5.3)
Slight	6 (15.8)
Moderate	18 (47.4)
High	11 (29.0)
Very high	1 (2.6)
Expectation	
No	1 (2.6)
Slight	3 (7.9)
Moderate	7 (18.4)
High	23 (60.5)
Very high	4 (10.6)
Anxiety	
No	0
Slight	4 (10.5)
Moderate	13 (34.2)
High	20 (52.6)
Very high	1 (2.6)
General health	
Not good	1 (2.6)
Slightly good	1 (2.6)
Moderately good	20 (52.6)
Good	13 (34.3)
Very good	3 (7.9)

very good general health condition (36, 94.8%) but also had moderate-to-very high anxiety (34, 89.4%). The scores for confidence, expectations, general health, and anxiety are shown in Table 1. The mean scores (SD) of the WHOQOL-BREF, happiness measures, confidence, expectations, general health, and anxiety at commencement, day 100, and year 2 of the training program are shown in Table 2.

For the HRQOL at baseline, the scores were as follows: social domain (73.03), environmental domain (66.78), psychological domain (65.46), and physical domain (54.23). The psychological score significantly decreased after enrollment ($P < 0.001$), with the score decreasing approximately 8 and 17 units after day 100 and year 2 of enrollment (Table 2). The physical and social scores also significantly decreased after day 100 and were maintained at these levels until year 2. A similar trend was observed in the environment score, except that the score increased about 5 units from day 100 to year 2. Happiness scores also significantly decreased after enrollment: 45.70 (SD = 19.2) and 47.95 (SD = 18.1) compared to 58.82 (SD = 12.6) at baseline ($P < 0.001$). A similar change was seen in general health data: 2.87 (SD = 0.0) and 3.05 (SD = 1.0) compared to 3.42 (SD = 0.8) at baseline. The confidence score tended to follow the changing pattern of happiness and general health scores without statistical significance. For expectations and anxiety, the reduction of the day 100 and year 2 scores was not significantly different from baseline (Table 2).

The mixed linear regression model was constructed separately for each HRQOL domain and happiness score (Table 3). This suggested that the time of the residency training program was negatively associated with all domains of the HRQOL scores. After adjusting for confidence and general health for a few domains, all domain scores were respectively about 8 to 11 and 7 to 17 units lower at day 100 and year 2 compared to the base-

Table 2. The WHOQOL-BREF, happiness measure, and other variable scores at baseline, at day 100, and at year 2

	Baseline	Day 100	Year 2	P-value
WHOQOL-BREF				
Physical domain ^{a)}	54.23 (7.2)	42.67 (10.7)	42.66 (12.0)	< 0.001
Psychological domain ^{a)}	65.46 (4.1)	57.24 (8.9)	48.46 (9.7)	< 0.001
Social domain ^{a)}	73.03 (15.1)	63.38 (17.7)	62.16 (16.6)	< 0.001
Environment domain ^{a)}	66.78 (11.6)	54.69 (14.2)	59.71 (13.0)	< 0.001
Variable				
Happiness measure ^{a)}	58.82 (12.6)	45.70 (19.2)	47.95 (18.1)	< 0.001
Confidence ^{b)}	3.11 (0.9)	2.95 (0.9)	3.08 (0.8)	0.515
Expectation ^{b)}	3.68 (0.9)	3.54 (0.9)	3.51 (0.8)	0.559
Anxiety ^{b)}	3.46 (0.7)	3.32 (0.9)	3.14 (0.8)	0.078
General health ^{b)}	3.42 (0.8)	2.87 (1.0)	3.05 (1.0)	0.008

WHOQOL, World Health Organization Quality of Life.

^{a)}Mean (SD). ^{b)}Rating scale of 1 to 5.

line enrollment scores.

Confidence was also significantly associated with all HRQOL domains, except for the social domain. Residents who had moderate-to-very high confidence would have about 4 to 6 units of HRQOL scores higher than residents who had no or slight confidence. In addition, general health was positively associated with the social and environmental domains, whereby residents with good or very good health conditions would have about 4 to 6 units of HRQOL higher than residents without the good health condition. The happiness measures score was about 12 units significantly lower at day 100 and year 2 compared to the baseline enrollment score. Residents who had high-to-very high anxiety would have about 10 units lower of the happiness measures compared to those who had no-to-moderate anxiety. However, those with good or very good general health would have a happiness measures score about 7 units higher than those without good general health.

DISCUSSION

We have conducted this study on a cohort of 38 residents training in internal medicine. The HRQOL and happiness scores decreased approximately 3 months after enrollment and remained at the lower level until year 2. Confidence and general health conditions positively influenced the HRQOL and happiness scores, whereas anxiety had a negative effect on the happiness scores. HRQOL improved slightly only in the environmental domain after two years. Nevertheless, the HRQOL scores of all domains were still lower than they were at commencement. Evidence of some positive change was seen with increasing happiness measures scores and the return of self-confidence and general health. Additionally, the anxiety of residents gradually decreased as time passed. However, the psychological domain of the WHOQOL-BREF was the only HRQOL component continually deteriorating even at the second year.

Our findings also suggest that having moderate-to-very high confidence alleviated the reduced levels of the physical, psychological, and environmental domains of the WHOQOL-BREF to a certain extent. Similarly, the social and environmental domains were less affected if good-to-very good general health was maintained. The residency training program did make trainees feel less happy, which was compounded by the presence of high-to-very high anxiety. However, the problem would be less serious if residents managed to maintain good physical health during the training period.

Physicians' distress, fatigue, and exhaustion are independently related to medical errors [9]. High prevalence of fatigue, distress, and burnout has been widely reported among internal medicine residents [4,5,9-12]. HRQOL, a concept embracing

Table 3. Factors correlated with World Health Organization Quality of Life and happiness scores: a mixed linear regression analysis from 38 residents at the department of medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

Criterion	Predictor	Mean (SD)	β-coefficient	SE	P-value
Physical domain	Time of training				
	Baseline	54.2 (7.2)	0	-	-
	Day 100	42.7 (10.7)	-11.2	2.0	<0.001
	Year 2	42.7 (12.0)	-11.6	2.0	<0.001
	Confidence				
	No to slight	41.4 (11.0)	0	-	-
	Moderate to high	48.1 (11.2)	6.3	2.2	0.004
Psychological domain	Time of training				
	Baseline	65.5 (9.1)	0	-	-
	Day 100	57.2 (8.9)	-8.0	1.6	<0.001
	Year 2	48.5 (9.7)	-17.1	1.7	<0.001
	Confidence				
	No to slight	53.3 (12.8)	0	-	-
	Moderate to high	58.8 (10.9)	4.5	2.0	0.021
Social domain	Time of training				
	Baseline	73.0 (15.1)	0	-	-
	Day 100	63.4 (17.7)	-8.4	2.6	0.001
	Year 2	62.2 (16.6)	-10.9	2.5	<0.001
	General health				
	Not good to moderately good	63.6 (18.0)	0	-	-
	Good to very good	71.5 (13.8)	6.1	2.7	0.025
Environmental domain	Time of training				
	Baseline	66.8 (11.6)	0	-	-
	Day 100	54.7 (14.2)	-10.9	2.0	<0.001
	Year 2	59.7 (13.0)	-7.1	2.0	<0.001
	Confidence				
	None-slight	55.5 (14.3)	0	-	-
	Moderate to very high	61.9 (13.4)	5.2	2.5	0.034
General health	Not good to moderately good	57.4 (13.7)	0	-	-
	Good to very good	66.4 (12.2)	4.2	2.1	0.046
Happiness measures	Time of training				
	Baseline	58.8 (12.6)	0	-	-
	Day 100	45.7 (19.2)	-12.9	3.0	<0.001
	Year 2	47.9 (18.0)	-12.7	3.0	<0.001
	Anxiety				
	No to moderate	56.1 (16.7)	0	-	-
	High to very high	44.2 (16.7)	-9.7	3.1	0.002
	General health				
	Not good to moderately good	46.1 (17.5)	0	-	-
Good to very good	60.2 (13.9)	7.0	3.1	0.024	

physical, psychological, emotional, and social functioning, has been previously reported as impaired in internal medicine residents [5,9,10]. A national study of internal medicine residents in the United States reveals the incidence of suboptimal HRQOL and overall burnout in 14.8% and 51.5% of trainees, respectively [10]. Other than their impact on the unsatisfactory results of the examination scores, low HRQOL and emotional exhaustion can lead to increased risks of medical errors

[9,10]. Sleep deprivation, stress, burnout, being overloaded with critical patients, and having financial debts can be the causes of poor HRQOL in residents [5,10,12,13]. In this study, reduction of HRQOL in internal medicine residents after starting the training program is shown. Even at the second year of the residency training program, HRQOL scores of all domains were still lower than they were at the commencement of the program. It should also be noted that our findings do not ad-

here to the results of a previous study conducted by Macedo et al. [5] on internal medicine residents, which revealed that the HRQOL scores of the second and third year of residency training were higher than those of the first year. However, it would have been more useful if our study had evaluated HRQOL at the third year of training or at the conclusion of the residency program. Nevertheless, reducing working hours and overloaded tasks of critical patients may indeed raise the HRQOL of residents, although it is suspected that there is a negative effect on medical education and patient safety [4].

In conclusion, fatigue, mental distress, and burnout, which emerged during the residency training period, impaired quality of life and satisfaction after enrollment until, at least, the second year of the residency training. Therefore, early reinforcement of self-confidence, physical health, and well-being in internal medicine residents might help prevent the deterioration of their quality of life and happiness.

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CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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SUPPLEMENTARY MATERIAL

WHOQOL-BREF, happiness measures, and the research questionnaires used in the study. Audio recording of the abstract.

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