

Health Information Managers' Job Stress in an Electronic Medical Record Environment

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ABSTRACT

This study sought to measure the influence of HIMs' work environment changes on job stress, and to explore measures for improving job satisfaction among them. A total of 275 hospital HIMs' were surveyed using a structured questionnaire. Significant job stress impact variables were sorted out using a simple linear regression analysis. Then, through multiple linear regression analysis, multicollinearity was tested. Significant impact factors were identified from among the control variables, and job stress impact was measured. The survey revealed that in public hospitals where the EMR system has been implemented for a longer period, depression scores in HIMs' were increased. HIMs' job stress level was found to be affected by the following factors: computerization of their working environment, experience of depression, unemployment, and manpower reduction, as well as, their lifestyles, including leisure activities. The results of this study suggest that HIMs' job stress can be reduced through work environment improvement and improvement of their personal lifestyle habits

Key words: *Electronic Medical Records, Job Stress, Job Performance, Health Information Management, Health Information Management Professionals.*

1. INTRODUCTION

With the medical service environment becoming increasingly competitive, services other than medical technology, such as the provision of good-quality medical services, transport, facilities, and manpower, determine whether or not hospitals can be perpetuated [1]. Notably, to minimize labor costs, due to professionalism and labor intensity, hospitals try to hire non-regular workers across their operations,

to maintain employment flexibility [2]. In South Korea, in the late 2000s, large hospitals began to adopt the Electronic Medical Record(EMR) system in line with labor market changes and overseas market trends. The EMR system reduced labor and maintenance costs, and enhanced both efficiency and data compatibility, thus, bringing about positive economic effects and advantages, although it incurred huge system construction costs and raised vulnerable security problems [3]. Overseas, Australia, Canada, New Zealand, and the UK are endeavoring to adopt the EMR system [4]. Canadian EMR adoption rates have continued to increase: the most recent National Physician Survey in 2013 reports that 62% of physicians were using EMR system. Currently interoperable EHRs are at various stages of implementation and maturity and

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Manuscript received Jan 04, 2017; revised Mar. 29, 2017;
accepted Apr.06, 2017

have evolved according to provincial/territorial strategies and priorities across Canada [5]. The U.S. began to adopt the EMR system in 2002; and in 2007, it began to adopt not only basic EMR systems but also full-function EMR systems [6]. With the introduction of the EMR system, HIMs should not only conduct in-depth analyses of stored data in the IT-based medical environment, verify coding, and educate medical teams, but also expand their knowledge of IT, medical management, and medical consumer information, whereas in the past, they mainly conducted quantitative analyses, which included inputting of medical chart data into computers [7]. In addition, in line with HIMs' role changes, HIM education should focus more on data management, quality improvement, statistics, and information technology [3]. Medical records can significantly affect people's lives and health, so their management requires adequate review [8].

South Korea experienced, both medical environment changes, as well as, labor market changes in the wake of its foreign exchange crisis and subsequent economic setback [2]. As a result, companies generally adopted labor flexibility to respond to their fast-changing internal and external business environments and to boost their competitiveness [9]. Amid this changing economic environment, the economy worsened, which led to employment cuts, the expansion of non-regular job markets, and involuntary adoption of non-regular jobs [9]. In South Korea, the number of non-regular jobs in hospitals continued to rise after the country's foreign exchange crisis, and even national university hospitals were increasing their pool of non-regular workers to improve national health and national healthcare services [10]. However, regarding non-regular jobs, problems concerning work attitude, productivity, and discrimination in welfare benefits are beginning to rise [2]. It has been noted that job immersion and satisfaction are reported to boost productivity [11], so concern about non-regular workers' job attitudes is increasing. Although manpower is the key to hospital service quality, the percentage of regular workers continues to fall, and the percentage of non-regular workers continues to rise [10]. Due to the inappropriate restructuring of hospital labor markets and the adoption of the EMR system, HIM jobs and roles are changing, and these changes can directly affect job satisfaction, so these problems should not be neglected if the continued provision of quality services is desired.

With the rise in the percentage of non-regular jobs, not only in general labor markets, but also in hospital labor markets due to labor changes, both regular and non-regular workers must be further surveyed. In addition, with the adoption of the EMR system, changes in HIMs' job tasks must be examined. Thus, there is a need to systematically analyze HIMs' work environment and present measures to efficiently manage it.

Therefore, this study seeks to survey the work environment of HIMs and identify the environments effects on their job stress, in order to help boost HIM job satisfaction.

2. RESEARCH METHODOLOGY

2.1 Data collection

The first survey was conducted with the HIMs who attended the autumn workshop in October 2012 as the targets. Five hundred copies of the questionnaire were distributed to them, 120 of which were collected. The second survey was conducted among HIMs who attended the municipal and provincial HIM refresher courses in April and May of 2013 as the targets, using the same questionnaire as those in the first survey. Likewise, 500 copies of the questionnaire were distributed to them, 155 of which were collected. Thus, the response rate was 27.5%, as 275 of the total 1,000 copies of the questionnaire were collected.

2.2 Manipulative Definition of the Variables

The research variables were selected and the number of samples was set based on those in previous studies. To identify the HIMs' job stress impact factors, their job stress was set as a dependent variable, and their hospital establishment type, hospital type, employment status, position, wage, license acquisition year, current hospital service period, EMR start year, EMR type, depression score, experience of unemployment, restructuring, and manpower reduction, smoking or non-smoking habit, drinking or non-drinking habit, leisure activities, exercise or non-exercise habit, and other socio-demographic characteristics were set as the independent variables. The measurement methods and the manipulative definition of the variables are outlined as follows.

2.2.1 Manipulative Definition of the Variables

Job stress is defined as a feeling of mental strain and physical tension from the job [12]. It has been reported to have a powerful effect on the performance of workers and it particularly experienced by hospital workers affect the all of the medical services [13]. To measure job stress, the Korean Occupational Stress Scale (KOSS-SF), which consists of 24 questions (four on job demands, four on insufficient job control, three on inadequate social support, two on job insecurity, four on the organizational system, three on lack of rewards, and four on the occupational climate) was used. Each item was evaluated based on a five-point scale of 1, 2, 3, 4, and 5 points, which referred to "Not at all", "Not so", "Fairly so", "Somewhat" and "Very much so" respectively. The job stress was deemed to increase as the score approached 5 points.

2.2.2 Manipulative Definition of the Variables

2.2.2.1 Demographic Characteristics

The demographic variables consisted of the gender, age, marital status, education, and residential area. Marital status was classified into married and unmarried (which included unmarried, divorced, separated by death, or other). Education was classified into technical college, including high school, university, graduate school, and higher education. The residential area was classified as large cities, including Seoul and other metropolitan cities, and small and medium-sized cities.

2.2.2.2 Socioeconomic Characteristics

The socioeconomic variables were employment status, position, wage, license acquisition year, current hospital service period, experience of unemployment, experience of restructuring, and experience of manpower reduction. Employment status was classified into regular and non-regular jobs (which included dispatched jobs, temporary jobs, contracted or commissioned jobs, and others). The positions were classified into non-employees and employees (which included presidents, general managers, deputy general managers, managers, team heads, assistant managers, and professors). The wages were classified into below KRW 30 million, KRW 30-50 million, and above KRW 50 million.

2.2.2.3 Work Environment Characteristics

The work environment variables were: establishment type, kind of hospital, EMR start year, and EMR type. The establishment types were classified into private and public establishments; and the kinds of hospitals, into tertiary hospitals, general hospitals. The EMR types were classified into the full-text type, the text with image type, and the image with OCS(Order communication system) type. Full text type of EMR system is a fully data entering system by structured data entry, text with image type EMR is combined type of data entered system and computerized image file after manually writing, and image with OCS type is a combined system of computerized physician order entry and computerized image file after manually writing without structured data entry.

2.2.2.4 Health Type Variables

The health type variables were set as lifestyle habit variables that can affect individuals' daily health and can be controlled personally [9], and that can affect job stress [14]. Thus, they included smoking, drinking, exercise, leisure activities, and depression score. Smoking, drinking, exercise, and leisure activities were investigated at two levels.

The depression score was set as a continuous variable and measured. Depression refers to loss of desire, weight change, and other mental and physical symptoms and emotional status changes (American Psychological Association 1994), and to a negative psychological status that adversely affects mental health [15]. To measure the depression state, the CESD-10 scale, which consisted of 10 questions from Radloff's Center for Epidemiologic Studies-Depressed Mood Scale (CESD)[16], was used. The Korean version of the CESD-10 also consisted of 10 questions and designed to measure depressive symptoms in the Korean general population. The questions were regarded the subject's emotions, attitudes, and behavioral changes in the past week. The changes in the responses to the questions from the baseline week to the following week were scored as follows: from "The thought did not occur to me" to "The thought briefly occurred to me" 0; from "The thought often occurred to me" to "The thought always occurred to me" 1 point; from "The thought did not occur to me" to "The thought often occurred to me" 2 points; and from "The thought did not occur to me" to "The thought always occurred to me" 4 points. Of these questions, two were reverse questions, so the opposite was considered. The total score for these 10 questions ranged from

0 to 10; and a score of 4 or above was generally considered indicative of depression [2].

2.3 Analytical Method

Based on the collected questionnaires, the subjects were defined and the HIM job stress factors were analyzed. A frequency analysis was conducted to identify the subjects' demographic, socioeconomic, work environment, and health type characteristics. To measure the average and standard deviations by variable, the average by group was analyzed. Significant job stress impact variables were sorted out using simple linear regression analysis. Then through multiple linear regression analysis, multicollinearity was tested, significant impact factors were identified from among the control variables, and the job stress impacts were measured. The data were analyzed using IBM SPSS 21.0 Version.

3. RESULTS

3.1 General Characteristics of the Subjects

Of the 258 subjects, 223 (86.4%) were female, and 30 (11.3%) were male. By age, 189 (73.2%) were in their 20s to 30s; 41 (15.9%), in their 40s; and 17 (6.6%), in their 50s and above. By marital status, 131 subjects (50.8%) were unmarried (including divorced, separated by death, and others), and 124 (48.1%) were married. By education, 45 (17.4%) were high school or three-year or lower-class technical college graduates; 167 (64.7%) were university graduates; and 43 (16.7%) were graduate school graduates. By residential area, 185 (71.7%) lived in large cities, and 69 (26.7%), in small and medium-sized cities.

By hospital establishment type, 217 subjects (84.1%) worked in private hospitals, and 30 (11.6%), in public hospitals. By hospital type, 152 (58.9%) worked in tertiary hospitals, and 101 (39.1%), in general hospitals. By employment status, 186 (72.1%) were regular workers, and 70 (27.1%), non-regular workers, including dispatched, temporary, contractual, and other workers. By position, 162 (62.8%) were employees, and 91 (35.3%), non-employees. By wage level, 97 (37.6%) earned less than KRW 30 million; 104 (40.3%), KRW 30-50 million; and 54 (20.9%), more than KRW 50 million. The average license acquisition year was 2002, and the average hospital working period was 107 months. The average year when the EMR system began to be used was 2006. By EMR type, 109 subjects (42.2%) encountered the full-text EMR; 83 (32.2%), the text with image type EMR; and 41 (15.9%), the image with OCS type EMR. By experience of unemployment, 52 (20.2%) experienced it, and 203 (78.7%) did not. By experience of restructuring and manpower reduction, 71 (27.5%) experienced them, and 180 (69.8%) did not. By smoking, 12 (4.7%) were smokers, and 243 (94.2%), non-smokers and past smokers. In terms of drinking, 143 (55.4%) were drinkers, and 112 (43.4%), non-drinkers and past drinkers. In terms of leisure activities, 202 (78.3%) had regular leisure activities, and 55 (21.3%) did not have leisure activities. In terms of exercise, 74 (28.7%) had regular exercise, and 181 (70.2%) did not. The average depression score was 16.8 points Table 1.

Table 1. Subject characteristics

	Variable	N (%), Mean±SD (Max, Min)
Demographic Characteristics		
Gender	Female	223 (86.4)
	Male	30 (11.6)
Age	20s-30s	189 (73.2)
	40s	41 (15.9)
	Over 50	17 (6.6)
Marital status	Unmarried	131 (50.8)
	Married	124 (48.1)
Education	Lesser than college	45 (17.4)
	University	167 (64.7)
	Graduate school	43 (16.7)
Socioeconomic Characteristics		
Employment status	Regular job	186 (72.1)
	Non-regular job ³	70 (27.1)
Position	Employee	162 (62.8)
	Non-employee ⁴	91 (35.3)
Wage level	Below KRW 30 million	97 (37.6)
	KRW 30-50 million	104 (40.3)
	Above KRW 50 million	54 (20.9)
License acquisition year		2002.3±7.99 (1985, 2013)
Experience of unemployment	Yes	52 (20.2)
	No	203 (78.7)
Experience of manpower reduction	Yes	71 (27.5)
Experience of manpower reduction	No	180 (69.8)
Job type	Analysis division	39 (15.1)
	Managerial division	148 (57.4)
	Analysis and managerial division	24 (9.3)
	General affairs	39 (15.1)
Work Environment Characteristics		
Type of EMR	Full-text EMR	109 (42.2)
	Text with image EMR	83 (32.2)
	Image with OCS EMR	41 (15.9)
Current hospital working period(month)		107.3±98.12 (1,468)
EMR start year		2006±3.76 (1998, 2012)
Health Type Variables		
Smoking	Smoker	12 (4.7)
	Non-smoker ⁵	243 (94.2)
Drinking	Drinker	143 (55.4)
	Non-drinker ⁶	112 (43.4)
Leisure activities	Yes	202 (78.3)
	No	55 (21.3)
Exercise	Yes	74 (28.7)
	No	181 (70.2)
Depression score		16.84±5.47 (10, 42)

¹Large cities:Seoul, Incheon, Daejeon, Daegu, Busan, Gwangju, and Ulsan²Medium-sized and small cities:Gyeonggi, Chungcheong, Jeolla, Gyeongsang, and Gangwon³Non-regular jobs:Dispatched, temporary, contractual, and other jobs⁴Non-employees:Presidents, general managers, deputy general managers, managers, team heads, assistant managers, professors, and others⁵Non-smokers:Non-smokers and past smokers⁶Non-drinkers: Non-drinkers and past drinkers

3.2 Significant Job Stress Impact Factors (Unadjusted)

This study found that the significant job stress impact factors were: establishment type, employment status, experience of restructuring and manpower reduction, job type, leisure activities, and depression score. By establishment, job stress was lower in private hospitals than in public hospitals ($p = 0.020$). By employment status, job stress was greater in regular jobs than in non-regular jobs ($p = 0.015$). In terms of experience with restructuring and manpower reduction, those who experienced them had greater stress than those who did not ($p = 0.009$). By job type, the analysis management division

staff had greater stress than the general affairs and team management staff ($p = 0.012$ and 0.034 , respectively). In terms of leisure activities, those who did not have leisure activities experienced greater stress than those who had leisure activities ($p = 0.002$). Those with higher depression scores had greater job stress ($p < 0.001$). In addition, VIFs, which are the explanation power levels of individual, independent, variables versus those of other independent variables, were all lower than the cut-off threshold of 10, indicating that there was no multi collinearity problem Table 2.

Table 2. Job stress impact factors

	Variable	β	t (p Value)
Demographic Characteristics			
Gender	Female	2.257	1.270 (0.205)
	Male	Ref	
Age	20s-30s	-0.022	-0.287 (0.135)
	40s	0.136	1.751 (0.171)
	Over 50	Ref	
Marital status	Unmarried	-0.035	-0.577 (0.564)
	Married	Ref	
Education	Lesser than college	0.041	0.516 (0.606)
	University	0.093	1.163 (0.246)
	Graduate school	Ref	
Socioeconomic Characteristics			
Employment status	Regular job	0.147	2.438 (0.015)
	Non-regular job ³	Ref	
Position	Employee	-0.033	-0.542 (0.588)
	Non-employee ⁴	Ref	
Wage level	Below KRW 30 million	-0.066	-0.837 (0.403)
	KRW 30-50 million	0.067	0.855 (0.393)
	Above KRW 50 million	Ref	
License acquisition year		-0.047	-0.737 (0.462)
Experience of unemployment	Yes	0.101	1.656 (0.099)
	No	Ref	
Experience of manpower reduction	Yes	0.165	0.009
	No	Ref	
Work Environment Characteristics			
Type of EMR	Full-text EMR	0.013	0.144 (0.885)
	Text+imageEMR	-0.042	-0.462 (0.644)
	Image+OCS EMR	Ref	
Current hospital working period (month)		0.056	0.892 (0.373)
EMR start year		-0.102	-1.579 (0.116)
Job categories	Analysis division	4.089	2.543 (0.012)
	Managerial division	-0.061	-0.026 (0.979)
	Analysis/managerial division	4.124	2.131 (0.034)
	General affairs		
Health Type Variables			
Smoking	Smoker	-0.006	-0.097 (0.923)
	Non-smoker ⁵	Ref	
Drinking	Drinker	-0.025	-0.408 (0.684)
	Non-drinker ⁶	Ref	
Leisure activities	Yes	-0.188	-3.134 (0.002)
	No	Ref	
Exercise	Yes	-0.113	-1.853 (0.065)
	No	Ref	
Depression score		0.437	7.904 (< 0.001)

3.3 HIM Stress Level by Job

Fig. 1 shows the HIMs' stress levels by job. The HIMs' jobs are classified into 12 types: general affairs, team management, classification of diseases and medical acts, management of inappropriate records, cancer registration, support for medical research, management of outgoing data, management of image medical records, issuance of transcripts, transcription of medical records, review of medical cost claims. The graph shows that as the average stress score of the HIMs who performed such jobs increased the higher score means a higher level in the stress. The HIMs responsible for general affairs and team management were the department heads, whose major tasks were analytical (classification of diseases and medical acts, management of inappropriate records, cancer registration, statistical diagnosis, and support for medical research), and managerial (management of outgoing data,

medical image recording, issuance of transcripts, and transcription of medical records). By major job category, stress was greater with analytical work. In individual jobs, stress was greater with the creation of diagnosis statistics, and lowest with the review of medical cost claims. The diagnosis statistics job not only involves the calculation of structured statistics, but also, the compilation of non-structured statistics and urgent image statistics, which makes it difficult to predict an HIM's job. Furthermore, the job, which involves decision-making, requires accuracy, timely handling and speed, while requiring analytical techniques, database management techniques, and other job forms of knowledge and skills, which all need to be continuously updated. For these and other reasons, it can be assumed that HIMs responsible for diagnostic statistics have the highest stress level Fig. 1.

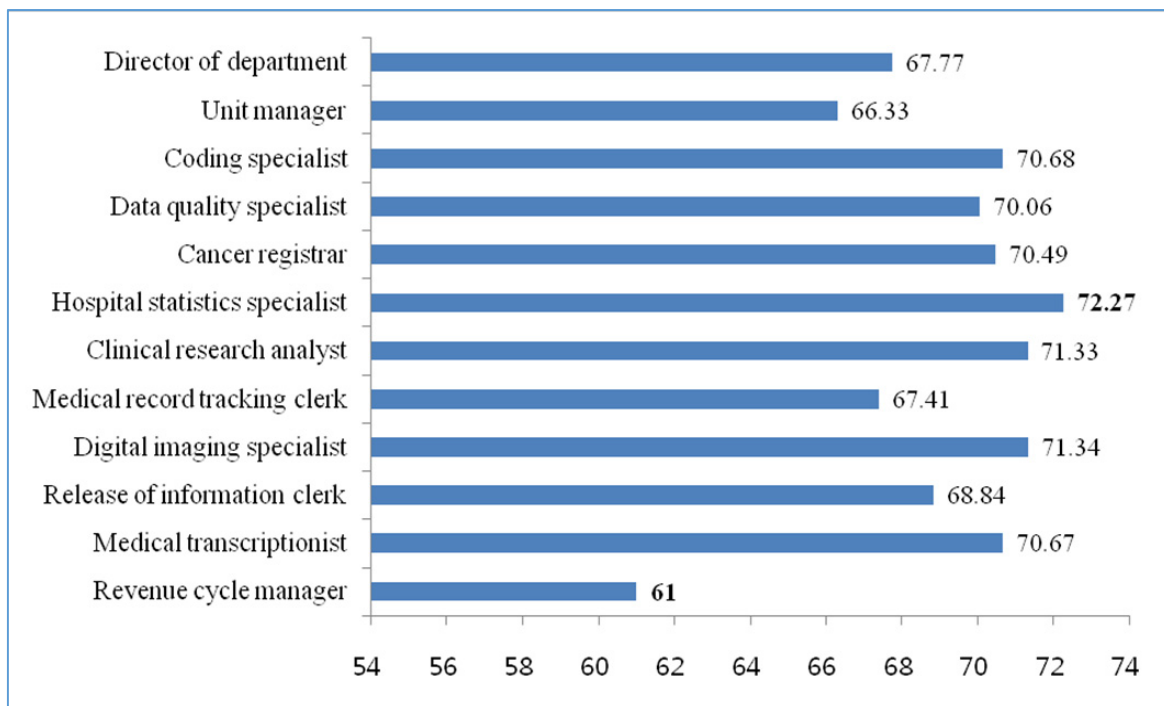


Fig. 1. HIM stress scores by job titles

3.4 HIM Job Stress Impact Factors

To identify the HIMs' job stress impact factors, a stepwise process was conducted. It revealed that significant job stress impact factors are establishment type, wage, EMR start year, depression score, experience of unemployment, experience of restructuring and manpower reduction, job type, and leisure activities. Specifically, by establishment type, job stress was greater in public hospitals than in private hospitals; by wage level, in HIMs who earned KRW 30-50 million than in those who earned more than KRW 50 million; and in hospitals that started to use the EMR system earlier, and in HIMs who had experienced unemployment, restructuring, and manpower reduction, and who had higher depression scores, and those who experienced. By job type, HIMs with analytical jobs had greater job stress than those with general affairs and team management jobs. HIMs who had no leisure activities had greater job stress than those who had leisure activities Table 3.

4. DISCUSSION

HIMs' job stress impact factors were examined in terms of their demographic, socioeconomic, and working environment characteristics, and their health type variables. Notably, HIMs' direct and indirect environmental stress impact factors, including their work environment and self-development, were identified. As for HIMs' environment changes, it is difficult to compare this study with the inadequate previous studies on HIMs' job satisfaction and stress, unlike the many past studies on HIMs' role changes. Thus, this study referred to past studies on HIMs and other hospital employees.

Table 3. Job stress impact factors

Variable	β	t (p Value)
Establishment type		
Private	-5.000	-2.590 (0.010)
Public	Ref	
Wage level		
KRW 30-50 million	3.433	2.969 (0.003)
Above KRW 50 million	Ref	
EMR start year	-0.552	-3.125 (0.002)
Depression score	0.573	5.549 (< 0.001)
Experience of unemployment		
Yes	4.428	3.012 (0.003)
No	Ref	
Experience of manpower reduction		
Yes	2.732	2.137 (0.034)
No	Ref	
Job type		
Analysis division	3.024	3.259 (0.001)
General affairs and team management	Ref	
Leisure activities		
Yes	-3.266	-2.395 (0.018)
No	Ref	
R Square	0.37	
F	14.773	
df	7	
Δ R Square	0.04	
F for Δ R square	11.185	

As for the demographic factors, no statistically significant variable was identified. In terms of socioeconomic characteristics, HIM job stress levels varied significantly according to wage levels and the experience of restructuring and manpower. First, earners of KRW 30-50 million had greater job stress than earners of over KRW 50 million. This is similar to the findings from previous studies that a lower wage led to higher job stress and lower job satisfaction [17], and suggests that a lower wage can lead to greater job stress because the HIM feels insufficiently rewarded for his or her efforts, and therefore, that a fair wage must be paid [2]. In addition, the subjects who had experienced unemployment, restructuring, and manpower reduction had greater job stress than those who had not experienced them. This is similar to the findings from previous studies including: Yong et al. and Gang [18], [19], which showed that job instability increases job stress, and is thus a high-impact variable; also Mariana [20] that showed employment instability adversely affects psychological health; and Valerie J [21] which demonstrated that poor psychological health negatively affects job satisfaction. These findings suggest that employment instability due to personal experiences with unemployment, restructuring, and manpower reduction, have negative psychological effects and even cause job dissatisfaction.

The test of the working environment characteristics revealed that HIMs' job stress levels varied significantly according to their establishment type and EMR system start year. First, by establishment type, job stress was greater in public hospitals than in private hospitals. This is unlike the findings from the study of Kim et al. [22] that said worker

satisfaction was greater in national and public hospitals. This is because national and public hospitals were considered to have better welfare and stability systems than private hospitals [22]. On the contrary, according to another study [10], national and public hospitals had inadequate manpower due to social systems and managerial factors. Based on the findings from yet another study [23], members of organizations lacking in suitable manpower had greater job stress, so public hospital HIMs are more stressed because they are fewer than the workforce of private hospitals, and therefore have to work harder.

Lately, the work environment of medical record administrators has gone through many changes as the result of the introduction of EMR, and changes in job stress, as a result of these environmental changes, cannot be overlooked [24]. According to this study, the earlier the starting year of EMR use, i.e. the longer it's been used, the higher the job stress is. While EMR was introduced, the importance of protecting and managing medical records, such as personal information and medical information of patients, was magnified instead of getting a variety of information from electronic information [24]. The study evaluating the importance of medical record administrators, in a gradually changing environment, described that if the introduction period of Electronic Medical Record is long, there is a longer counter period of information use requests to utilize information accumulated via medical research and medical education. In such a process a management standard and application system are needed [8]. According to such results, the longer the period of EMR use, the higher job stress is, because, people increase their stress

over the necessity of improvement in the performance process of their duties rather than adapting the system into their work.

The test of the health types revealed that HIMs' job stress levels varied significantly according to their depression scores and leisure activities. Higher depression scores led to higher job stress. This is similar to the findings from Iacovides et al.'s [25] study that greater job stress rates were more associated with greater depression scores, and that workers without leisure activities had greater job stress than those who had them. This resonates with findings from other studies that show satisfaction with one's leisure activities lessened one's job stress, which in turn enhanced one's job satisfaction. This suggests that the HIMs boosted their job satisfaction by resolving their job stress and adapting themselves to their work environment, and that they pursued leisure activities to resolve stress [26].

The US Department of Labor's 2012 estimation of manpower [27] revealed that an additional 40,000 HIMs were required at that time, and that the job of a HIM was considered very promising. Such estimation was based on the observed greater need for HIMs capable of systematically managing diagnosis information due to changes in hospitals' informatization environment. In this fast-changing medical service environment, HIMs need to keep acquiring knowledge and skills to continuously develop as professionals.

As examined herein, HIMs' job stress levels varied according to the nature of their job, and the stress of HIMs, whose job was to analyze medical record information, was notably greater. Such HIMs' key capacity was the classification of diseases and medical acts, management of inadequate records, cancer registration, diagnosis statistics, and support for medical research. In addition, in the current informatization environment, a wide range of diagnostic information is gathered from patients and used, so it was evaluated as a key performance index before the external evaluation. Thus, the need to manage such information more accurately is stressed, thereby increasing such HIMs' job stress. On the contrary, the job stress of the general affairs and team management HIMs was lower. Therefore, the organizational culture perceived by department heads and team managers must be improved, and members of departments need to be motivated to change their roles and to receive greater support in this regard. As such, amid HIMs' changing work environment, to expand their professional areas, their managers' leadership skills must be further boosted.

In this study, only a year's worth of data was used, so there were limitations in the examination of continuous results. Second, randomly sampled subjects were surveyed instead of targeting individual hospitals, so there was inadequate sampling representation--i.e., South Korea's HIM working environment was not adequately represented. Third, due to the lack of studies on HIMs after the adoption of the EMR system, few comparative studies could be used. Despite these limitations, HIMs' job stress impact factors were successfully identified in this study. Thus, in line with today's changing hospital environment, this study points to the need for establishing measures for changing HIMs' job environment or role. The following implications emerged. Since HIMs' job is directly or indirectly related to patients' lives, their characteristics should be further researched based on studies on

other jobs. In addition, other impact factors related to work environment, health type, etc., which were not included in this study, should be handled systematically in other studies.

Job stress problems should not be perceived as personal problems, and measures for managing job stress should be prepared at both the hospital and government levels, as well as, both internal and external levels. To boost HIMs' work capacity, they must take job refresher courses and enroll in graduate schools or pursue self-development for life-long education. According to HIMs' characteristics, hospitals should offer them programs designed to reduce their job stress and to improve their mental health. These efforts will certainly not only reduce HIMs' job stress-related diseases but also boost their job satisfaction and productivity, which would help improve South Korea's national competitiveness.

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