

Satisfaction of industrial health care managers regarding the work of industrial hygiene engineers: a cross-sectional study

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Background: A group health service is a system that delegates workplace health management to an entrusted institution. There have been various studies on group health services to date, but recent changes, such as an increase in foreign workers, are rapidly changing industry characteristics.

Methods: Satisfaction was assessed using a 27-question survey distributed among 203 workplaces employing health professionals. The survey items consisted of general characteristics, comprehensive satisfaction, requirements for health professionals' work, and satisfaction with work environment management, ergonomic management, and healthcare management. Multiple regression and frequency analyses were performed.

Results: The comprehensive satisfaction was 4.08 points on average, out of 5. The comprehensive satisfaction of health professionals in the industry was positively correlated with each factor. Hazardous materials and chemical management (material safety data sheets, MSDSs) were the most common requirements.

Conclusion: A low level of satisfaction with work environment management indicates high demand for healthcare management. The working environment should be improved by identifying characteristics of the workplace, examining harmful substances, inspecting equipment, and enhancing worker methods. The shorter the work experience of health professionals, the more dependent they are on group health services. The variables affecting comprehensive satisfaction were the period of work, healthcare management satisfaction, and work environment management satisfaction. Most of the requirements of health professionals in the workplace were practical improvement case presentations, MSDSs, and legal document management.

Keywords: Consumer health information; Occupational health services; Public health practice

Introduction

Occupational health practices require experience, technology, and professional expertise. Small businesses find it difficult to provide occupational health care on their own, so health management in

small workplaces is commonly entrusted to health management institutions, called group health services.

The Enforcement Decree of the Industrial Safety and Health Act was promulgated in July 1990, and a system of small-sized businesses (50–300 workers), entrusting comprehensive health man-

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agement to specialized institutions was created [1]. Occupational health programs are conducted by doctors, nurses, and health management institutions to provide health counseling, health education, work environment management, ergonomic management, healthcare management, and health promotion [2,3]. Research on group health services is also increasing [4-6]. Recently, the demand for industrial health services has increased rapidly, leading to abrupt changes in the general characteristics of the industry. Therefore, new studies on the needs of and satisfaction with industrial health services are required to correctly assess the satisfaction of healthcare workers in the field. Therefore, it is important to clarify the impact of individual satisfaction factors on comprehensive satisfaction.

This study aimed to identify comprehensive satisfaction with services provided by professional healthcare institutions, including work environment management satisfaction, ergonomic management satisfaction, healthcare management satisfaction, and the practical needs for services by industry and scale.

Methods

Ethical statements: The protocol of this study was approved by the Institutional Review Board (IRB) of Yeungnam University Hospital (IRB No. 2017-003-005). Written informed consent was obtained from all participants for publication.

1. Study design

This study examined satisfaction with services provided by health management institutions in Daegu (region) and Gyeongsangbuk-do (including Yeongcheon, Gyeongsan, Gyeongju, and Pohang) in Korea. Excluding the businesses of which the researchers were in charge, 203 health professionals in the workplace were targeted. The survey was conducted from March 2, 2018 to March 30, 2018.

The survey items consisted of general characteristics (10 items), comprehensive satisfaction (one item), work environment management satisfaction (six items), ergonomic management satisfaction (three items), healthcare management satisfaction (six items), and requirements for health professionals' work (one item). The range of satisfaction was very satisfied (5 points), generally satisfied (4 points), usually satisfied (3 points), dissatisfied (2 points), and very dissatisfied (1 point). In this study, work environment management comprised providing assistance, advice, and guidance when purchasing health-related protective equipment, maintaining material safety data, and engineering improvements in workplace ventilation systems (e.g.,

full ventilation and local exhaust systems); conducting inspections of the workplace and facilities; changing work processes and procedures; and conducting inspections of the general environment (e.g., shower rooms, hallway stairs, toilets, lounges, and restaurants). Ergonomic management tasks comprised identifying and advising 11 items of musculoskeletal system burden work, investigating harmful factors in the workplace due to musculoskeletal burden work, and establishing appropriate preventive measures for weight-handling work. Healthcare management tasks consisted of the investigation and analysis of the causes of industrial accidents, prevention of recurrence, maintenance and analysis of statistics on industrial accidents, implementation of health matters under the Industrial Safety and Health Act, risk assessment, and health education plans. The general characteristics of a workplace included the number of workers and the industry. The general characteristics of health professionals included sex, age, work period, health service duration, department, and academic background. The practical needs for services included (1) practical improvement case presentations, (2) material safety data sheets (MSDSs), and (3) legal document management.

2. Statistical analyses

A frequency analysis was conducted to identify the general characteristics of the participants, and a reliability index, Cronbach α , was calculated. To identify differences in satisfaction with health service personnel by industry, *t*-tests were conducted. Independent *t*-tests, one-way analysis of variance, and Scheffe *post-hoc* tests were conducted to identify the difference in satisfaction with health service personnel in manufacturing and nonmanufacturing industries. Correlation analysis was conducted to understand the relationship between the sub-factors of satisfaction and health professionals.

Results

Cronbach alpha values for the overall satisfaction survey, work environment management satisfaction, and health care management satisfaction were found to be highly reliable (0.887, 0.867, and 0.900, respectively) (Table 1). The study included 151 men (74.4%) and 52 women (25.6%) among the participants. The most common types of participants were aged between 30 and 39 years (44.8%), had 1 to 4 years of service (46.8%), and worked as assistant managers (22.2%). The most common workplace size was between 50 and 99 workers (50.7%), followed by between 100 and 199 workers (20.7%), less than 50 workers (17.7%), and 200 or more workers (10.8%) (Table 2).

Out of a maximum score of 5, the average comprehensive satisfaction was 4.08, the average healthcare management satisfac-

tion was 3.90, the average work environment management satisfaction was 3.81, and the average ergonomic management satisfaction was 3.86. The comprehensive satisfaction of the health service group did not differ according to the characteristics of the manufacturing and nonmanufacturing sectors (Table 3). The satisfaction level with ergonomic management did not vary with the characteristics of the health professional in the workplace (Table 4). The satisfaction level of healthcare management at the manufacturing sites showed no statistically significant differences (Table 5).

Table 1. Reliability of satisfaction survey questions

Subregion	Questionnaire items	Cronbach alpha
Comprehensive satisfaction	1	-
Work environment management satisfaction	6	0.887
Ergonomic management satisfaction	3	0.867
Health care management satisfaction	6	0.900

Frequency analysis, Cronbach alpha calculated as reliability index.

Table 2. Common characteristics of business and health professionals

Characteristic	Manufacturing	Nonmanufacturing	Sum
Business			
No. of workers			
< 50	29 (18.6)	7 (14.9)	36 (17.7)
50–99	77 (49.4)	26 (55.3)	103 (50.7)
100–199	35 (22.4)	7 (14.9)	42 (20.7)
≥ 200	15 (9.6)	7 (14.9)	22 (10.8)
Health professionals			
Sex			
Male	118 (75.6)	33 (70.2)	151 (74.4)
Female	38 (24.4)	14 (29.8)	52 (25.6)
Age (yr)			
20–29	20 (12.8)	6 (12.8)	26 (12.8)
30–39	70 (44.9)	21 (44.7)	91 (44.8)
40–49	45 (28.8)	10 (21.3)	55 (27.1)
≥ 50	21 (13.5)	10 (21.3)	31 (15.3)
Overall period of work (yr)			
1–4	70 (44.9)	25 (53.2)	95 (46.8)
5–9	42 (26.9)	6 (12.8)	48 (23.6)
≥ 10	44 (28.2)	16 (34.0)	60 (29.6)
Position of work			
Staff	31 (19.9)	11 (23.4)	42 (20.7)
Administrative manager	18 (11.5)	12 (25.5)	30 (14.8)
Assistant manager	34 (21.8)	11 (23.4)	45 (22.2)
Manager	33 (21.2)	5 (10.6)	38 (18.7)
Deputy general manager	12 (7.7)	0 (0.0)	12 (5.9)
Department manager	21 (13.5)	6 (12.8)	27 (13.3)
Others (workplace safety manager, etc.)	7 (4.5)	2 (4.3)	9 (4.4)
Period of work as health professional (yr)			
< 1	23 (14.7)	10 (21.3)	33 (16.3)
1–2	29 (18.6)	10 (21.3)	39 (19.2)
3–4	29 (18.6)	11 (23.4)	40 (19.7)
4–5	29 (18.6)	4 (8.5)	33 (16.3)
6–10	27 (17.3)	6 (12.8)	33 (16.3)
> 11	19 (12.2)	6 (12.8)	25 (12.3)
Workplace			
Office	137 (87.8)	37 (78.7)	174 (85.7)
Other than office	14 (9.0)	8 (17.0)	22 (10.8)
Production	5 (3.2)	2 (4.3)	7 (3.4)
Total	156 (100)	47 (100)	203 (100)

Values are presented as number of workers (%).

Table 3. Satisfaction of health care management affairs

Characteristic	Manufacturing (n = 156)	Nonmanufacturing (n = 47)	Sum	p-value
	Mean ± SD	Mean ± SD	Mean ± SD	
Comprehensive satisfaction of health care entrustment	4.08 ± 0.62	4.09 ± 0.75	4.08 ± 0.65	0.987
Work environment management satisfaction	3.79 ± 0.61	3.89 ± 0.62	3.81 ± 0.61	0.323
Ergonomic management satisfaction	3.87 ± 0.68	3.83 ± 0.75	3.86 ± 0.69	0.731
Healthcare management satisfaction	3.89 ± 0.61	3.96 ± 0.67	3.90 ± 0.63	0.513

Independent *t*-test, Scheffe *post-hoc* tests, and analysis of variance were conducted. SD, standard deviation.

Table 4. Satisfaction of ergonomic management guidance according to the characteristics of business and health professionals

Characteristic	Manufacturing		Nonmanufacturing		Sum	
	Mean ± SD	p-value	Mean ± SD	p-value	Mean ± SD	p-value
No. of workers		0.784		0.287		0.638
< 50	3.78 ± 0.67		3.87 ± 0.78		3.86 ± 0.68	
50–99	3.88 ± 0.67		3.71 ± 0.76		3.88 ± 0.70	
100–199	3.94 ± 0.66		3.43 ± 0.71		3.90 ± 0.68	
≥ 200	3.80 ± 0.79					
Sex		0.166		0.766		0.309
Male	3.91 ± 0.68		3.81 ± 0.70		3.89 ± 0.68	
Female	3.74 ± 0.67					
Age (yr)		0.473		0.723		0.718
20–29	4.07 ± 0.66		3.67 ± 0.37		3.97 ± 0.62	
30–39	3.81 ± 0.71		3.78 ± 0.84		3.81 ± 0.73	
40–49	3.90 ± 0.61		3.80 ± 0.77		3.88 ± 0.64	
≥ 50	3.79 ± 0.73					
Period of work overall (yr)		0.340		0.478		0.707
1–4	3.91 ± 0.66		3.71 ± 0.68		3.86 ± 0.66	
5–9	3.93 ± 0.72		3.89 ± 0.72		3.92 ± 0.71	
≥ 10	3.74 ± 0.67					
Position of work		0.787		0.356		0.590
Staff	3.88 ± 0.65		3.88 ± 0.67		3.88 ± 0.65	
Administrative manager	3.91 ± 0.62		3.78 ± 0.66		3.86 ± 0.63	
Assistant manager	3.90 ± 0.69		3.58 ± 0.97		3.82 ± 0.77	
Manager	3.85 ± 0.77		3.93 ± 0.80		3.86 ± 0.77	
Deputy general manager	4.03 ± 0.59		4.39 ± 0.57		4.03 ± 0.59	
Department manager	3.84 ± 0.68		3.33 ± 0.47		3.96 ± 0.69	
Others (workplace safety manager, etc.)	3.48 ± 0.63				3.44 ± 0.58	
Period of work as health professional (yr)		0.594		0.333		0.498
< 1	3.96 ± 0.68		4.00 ± 0.50		3.82 ± 0.80	
1–2	3.87 ± 0.63		3.94 ± 0.66		3.91 ± 0.59	
3	3.91 ± 0.67		3.50 ± 0.43		3.92 ± 0.66	
4	3.92 ± 0.77		4.28 ± 0.68		3.87 ± 0.75	
5–9	3.89 ± 0.57		3.67 ± 0.97		3.96 ± 0.60	
≥ 10	3.60 ± 0.77				3.61 ± 0.80	
Workplace		0.369		0.634		0.569
Office	3.90 ± 0.67		3.83 ± 0.62		3.88 ± 0.70	
Other than office	3.64 ± 0.73		4.33 ± 0.47		3.71 ± 0.68	
Production	3.73 ± 0.68				3.90 ± 0.66	

Correlation analysis was conducted. SD, standard deviation.

Table 5. Satisfaction of guidance on industrial health information management according to the characteristics of business health professionals and industrial hygiene management engineers

Characteristic	Manufacturing		Nonmanufacturing		Sum	
	Mean \pm SD	<i>p</i> -value	Mean \pm SD	<i>p</i> -value	Mean \pm SD	<i>p</i> -value
No. of workers		0.989		0.435		0.916
< 50	3.87 \pm 0.51		4.03 \pm 0.64		3.93 \pm 0.51	
50–99	3.89 \pm 0.62		3.64 \pm 0.78		3.92 \pm 0.62	
100–199	3.91 \pm 0.67		3.81 \pm 0.82		3.87 \pm 0.69	
\geq 200						
Sex		0.109		0.610		0.301
Male	3.93 \pm 0.59		3.92 \pm 0.72		3.93 \pm 0.62	
Female						
Age (yr)		0.258		0.649		0.366
20–29	4.13 \pm 0.58		3.78 \pm 0.55		4.05 \pm 0.58	
30–39	3.85 \pm 0.64		3.98 \pm 0.62		3.88 \pm 0.63	
40–49	3.83 \pm 0.55		3.82 \pm 0.83		3.82 \pm 0.61	
\geq 50						
Period of work overall (yr)		0.146		0.954		0.347
1–4	3.95 \pm 0.62		3.93 \pm 0.64		3.95 \pm 0.62	
5–9	3.95 \pm 0.63		3.94 \pm 0.62		3.95 \pm 0.63	
\geq 10						
Position of work		0.737		0.466		0.426
Staff	3.97 \pm 0.59		4.06 \pm 0.66		4.00 \pm 0.61	
Administrative manager	3.91 \pm 0.62		3.89 \pm 0.65		3.90 \pm 0.62	
Assistant manager	3.89 \pm 0.72		3.71 \pm 0.74		3.84 \pm 0.72	
Manager	3.79 \pm 0.58		4.03 \pm 0.48		3.82 \pm 0.57	
Deputy general manager	3.90 \pm 0.60		4.39 \pm 0.69		3.90 \pm 0.60	
Department manager	3.99 \pm 0.58		3.67 \pm 0.94		4.08 \pm 0.62	
Others (workplace safety manager, etc.)					3.61 \pm 0.57	
Period of work as health professional (yr)		0.130		0.706		0.256
< 1	4.00 \pm 0.56		4.08 \pm 0.53		3.91 \pm 0.67	
1–2	3.91 \pm 0.61		4.00 \pm 0.52		3.96 \pm 0.59	
3	3.95 \pm 0.66		3.79 \pm 0.37		3.96 \pm 0.62	
4	3.97 \pm 0.63		4.25 \pm 0.76		3.94 \pm 0.61	
5–9	3.88 \pm 0.59		3.89 \pm 0.89		3.95 \pm 0.63	
\geq 10					3.61 \pm 0.66	
Workplace		0.718		0.729		0.724
Office	3.90 \pm 0.63		3.96 \pm 0.63		3.91 \pm 0.64	
Other than office	3.76 \pm 0.61		4.33 \pm 0.47		3.83 \pm 0.61	
Production					4.05 \pm 0.36	

Correlation analysis was conducted.
SD, standard deviation.

Discussion

A survey was conducted with health professionals at 203 workplaces to understand comprehensive satisfaction, work environment management satisfaction, ergonomic management satisfaction, healthcare management satisfaction, and the requirements of health professionals.

The overall satisfaction of health professionals averaged 4.08 out of 5, 3.90 for health care management satisfaction, 3.86 for work environment management satisfaction, and 3.81 for ergonomic management satisfaction. A reason for this result may be that regular visits by doctors, nurses, and industrial hygiene engineers maintain continuity in group health services. The working environment should be improved by identifying characteris-

tics of the workplace, examining harmful substances, inspecting equipment, and reviewing procedures before workshop tour inspections to provide realistic guidance suitable for the characteristics of the workplace [7]. The level of work environment management satisfaction was found to be high in the production and office groups of manufacturing industries. Healthcare management satisfaction differed significantly according to the duration of work experience. Workers with less than 1 year of experience had the highest satisfaction, and those with more than 10 years of experience had the lowest satisfaction. This means that the shorter the experience of a health professional at the workplace, the more dependent he or she is on group health services. The higher the work environment and health care management satisfaction, the higher the comprehensive satisfaction. In the manufacturing industry, a health professional work period of 2 to 3 years, work period of 3 to 5 years, work environment management satisfaction, and healthcare management satisfaction had significant effects on comprehensive satisfaction. In the non-manufacturing industry, healthcare management satisfaction had a significant impact on comprehensive satisfaction. Multiple regression analysis revealed that the work period of health professionals, health care management satisfaction, and work environment management satisfaction were variables that affected comprehensive satisfaction.

Three items accounted for most requirements of healthcare professionals in the workplace: (1) practical improvement case presentations, (2) MSDSs, and (3) legal document management. The reason these requirements were so high is that, first, improvement measures presented by occupational health program institutes can be difficult to apply practically; therefore, specific and realistic guidance is likely required. Second, acute poisoning accidents caused by chemicals frequently occur because of the lack of information about chemicals in the workplace. Data are needed for the rights of workers to know about chemicals and prevent occupational diseases and industrial accidents; therefore, the demand is high for health professionals and workers to have access to health education and MSDSs, and how to use them [8]. Third, most health professionals in the field perform other tasks (such as those related to worker safety, environment, water quality, fire safety, and the environment); hence, it is difficult to manage the legally required documents. Regarding the need for improvement, groups with 2 to 3, 3 to 5, and more than 10 years of work experience required the most management of hazardous materials and chemicals.

The study was conducted through a health management agency in Daegu and North Gyeongsangbuk-do Province using a satisfaction survey of health professionals in the workplace.

Notes

Conflicts of interest

Joon Sakong has been editorial board member of *Journal of Yeungnam Medical Science* since 2010. He was not involved in the review process of this manuscript. Otherwise, there is no conflict of interest to declare.

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Author contributions

Conceptualization, Formal analysis, Supervision: JS; Funding acquisition: JS; Writing-original draft: BSC; Writing-review & editing: MKK.

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