

Factors Associated with Health Care Worker Compliance with Procedure Manuals and Rules

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ABSTRACT

Background: Health care workers in hospitals are expected to comply with procedure manuals and rules. We investigated factors associated with compliance with procedure manuals and rules among health care workers classified by type of compliance behavior.

Methods: In 2012, all health care workers (n = 12076) in 18 Japanese hospitals were asked to complete an anonymous, self-administered, cross-sectional, questionnaire survey. Respondents were categorized into four groups according to their responses to two questions regarding their understanding and compliance with manuals and rules in their hospital. The four groups were safe worker, intentional violator, overconfident worker, and reckless worker. A generalized linear mixed model was used to identify factors associated with classification in the latter three groups.

Results: The response rate was 75.6% (9124/12076). Being an intentional violator or reckless worker was associated with lower job satisfaction (odds ratios [ORs]: 1.67 for intentional violator, 1.65 for reckless worker) and lesser perceived supervisor reliability (ORs: 1.96 for intentional violator, 1.62 for reckless worker). The number of night shifts worked in a month was associated with being an intentional violator (OR for \geq five shifts, 2.02). Being a physician (OR, 2.21), perception of staffing as insufficient (OR, 1.33), and participation in in-house patient safety workshops during the previous year (OR, 0.49) were associated with being a reckless worker.

Conclusions: Rules compliance among health care workers was associated with job satisfaction, perceived reliability of the supervisor, number of night shifts worked in a month, being a physician, perception of staffing, and participation in in-house patient safety workshops during the previous year.

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All health care workers in hospitals are expected to comply with manuals and rules for patient safety, and improving compliance among health care workers is a con-

cern worldwide.¹⁾ In other industries, many risk factors for violations have been identified, such as age, sex, education, staffing level, patient safety culture, time pressure, and

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workload.²⁾ Worker violations can be classified by conditions and behavior^{2,3)}; however, most previous studies did not investigate the association between the type of violation and its risk factors.²⁻⁵⁾ Hospitals have numerous manuals and rules. Although health care workers may find it difficult to memorize all this information, they are nevertheless required to comply with these rules. The factors associated with compliance and methods to improve compliance among health care workers may differ in relation to their level of understanding of procedure manuals and rules. Violations can be thus categorized by the worker's level of understanding and compliance with manuals and rules. Risk factors for rule violations may differ with respect to the type of violation. We investigated factors associated with compliance with procedure manuals and rules among health care workers classified by type of compliance behavior.

Methods

In 2012, a cross-sectional study was conducted in 18 hospitals in Japan. The target hospitals were selected by convenience sampling, and all hospitals voluntarily participated in this study. Of the 18 hospitals, eight had fewer than 200 beds, seven had 200 to 499 beds, and three had 500 or more beds. They included three long-term care hospitals, three mixed care hospitals, and 12 acute care hospitals. All health care workers (n = 12076) at these hospitals completed the questionnaires anonymously and placed them in a collection box in an envelope provided for that purpose. The ethics committee of the Toho University School of Medicine approved the study (No. 23054).

Questionnaire

The questionnaire comprised questions on respondents' understanding of and compliance with procedure manuals and rules, their profession, years of experience in their specialty or profession, gender, working hours per week, number of night shifts worked in a month, perception of staffing, participation in in-house patient safety workshops during the past year, perceived reliability of the supervisor when problems arose, and job satisfaction. Previous studies identified these items as factors related to violations.^{2,3)} The items and responses were based on items included in the Hospital Survey on Patient Safety Culture and the Brief Job Stress Questionnaire.^{6,7)}

Data analyses

The respondents were categorized into four groups according to their responses to two questions: "Do you un-

derstand the manuals and rules in your hospital?" and "Do you comply with the manuals and rules in your hospital?". Only data from respondents who replied to these two questions were analyzed. The four groups were defined as indicated below.

Safe worker: respondent who understand manuals and rules and complies with them.

Intentional violator: respondent who understands manuals and rules but does not comply with them.

Overconfident worker: respondent who does not understand manuals and rules but is convinced that they comply with them.

Reckless worker: respondent who does not understand manuals and rules and does not comply with them.

Generalized linear mixed models (GLMM) with generalized logit link functions were used to assess multivariate associations of the four respondent groups with health care worker characteristics. In the GLMM, the response variable was the four above mentioned respondent groups, and the reference category was the respondent group safe worker. The fixed effects were profession, years of experience in their specialty or profession, gender, hours worked per week, number of night shifts worked in a month, staffing, participation in in-house patient safety workshops, perceived reliability of the supervisor when problems arose, and job satisfaction. The random effect was the difference between hospitals. Statistical analyses were performed using SPSS 22.0 (International Business Machines [IBM] Corp., Armonk, NY, USA).

Results

The response rate was 75.6% (9124/12076), and complete data from 8983 respondents were analyzed. Table 1 shows the characteristics of the respondents; 7577 (84.3%) were safe workers, 102 (1.1%) were intentional violators, 866 (9.6%) were overconfident workers, and 438 (4.9%) were reckless workers. In Japan, regulations require that hospitals hold in-house patient safety workshops at least twice a year. During the year before the survey, 69.3% of respondents had participated in such workshops.

Factors associated with understanding and compliance

The results of the GLMM are shown in Table 2. The odds ratio (OR) for being an intentional violator was significantly higher when health care workers worked five or more night shifts in a month (OR, 2.02) and when their supervisor was considered unreliable when problems arose

Table 1 Characteristics of respondents

	All respondents		Safe workers (understanding and compliance)		Intentional violators (understanding and noncompliance)		Overconfident workers (non-understanding and compliance)		Reckless workers (non-understanding and noncompliance)	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Profession										
Nurse	4095	(45.6)	3530	(46.6)	58	(56.9)	353	(40.8)	154	(35.2)
Nursing aide/Care worker	667	(7.4)	576	(7.6)	3	(2.9)	52	(6.0)	36	(8.2)
Physician	839	(9.3)	693	(9.1)	10	(9.8)	85	(9.8)	51	(11.6)
Clerk	1287	(14.3)	1045	(13.8)	13	(12.7)	155	(17.9)	74	(16.9)
Others	2095	(23.3)	1733	(22.9)	18	(17.6)	221	(25.5)	123	(28.1)
Years of experience in specialty or profession										
1-5	3551	(39.5)	2896	(38.2)	31	(30.4)	429	(49.5)	195	(44.5)
6-10	1818	(20.2)	1531	(20.2)	29	(28.4)	166	(19.2)	92	(21.0)
11-20	1991	(22.2)	1727	(22.8)	24	(23.5)	152	(17.6)	88	(20.1)
≥21	1114	(12.4)	1005	(13.3)	11	(10.8)	63	(7.3)	35	(8.0)
N/A	509	(5.7)	418	(5.5)	7	(6.9)	56	(6.5)	28	(6.4)
Gender										
Male	2132	(23.7)	1761	(23.2)	27	(26.5)	231	(26.7)	113	(25.8)
Female	6488	(72.2)	5526	(72.9)	70	(68.6)	583	(67.3)	309	(70.5)
N/A	363	(4.0)	290	(3.8)	5	(4.9)	52	(6.0)	16	(3.7)
Working hours per week										
<40	3012	(33.5)	2547	(33.6)	22	(21.6)	298	(34.4)	145	(33.1)
40-60	4670	(52.0)	3979	(52.5)	63	(61.8)	408	(47.1)	220	(50.2)
≥60	987	(11.0)	801	(10.6)	11	(10.8)	113	(13.0)	62	(14.2)
N/A	314	(3.5)	250	(3.3)	6	(5.9)	47	(5.4)	11	(2.5)
Number of night shifts in a month										
0	3718	(41.4)	3086	(40.7)	26	(25.5)	405	(46.8)	201	(45.9)
1-4	2823	(31.4)	2466	(32.5)	35	(34.3)	219	(25.3)	103	(23.5)
5	2116	(23.6)	1765	(23.3)	37	(36.3)	200	(23.1)	114	(26.0)
N/A	326	(3.6)	260	(3.4)	4	(3.9)	42	(4.8)	20	(4.6)
"We have enough staff to handle the workload."										
Strongly agree/Agree	2362	(26.3)	2041	(26.9)	22	(21.6)	198	(22.9)	101	(23.1)
Neither agree nor disagree	2276	(25.3)	1938	(25.6)	20	(19.6)	231	(26.7)	87	(19.9)
Strongly disagree/Disagree	4166	(46.4)	3453	(45.6)	55	(53.9)	418	(48.3)	240	(54.8)
N/A	179	(2.0)	145	(1.9)	5	(4.9)	19	(2.2)	10	(2.3)
Participation in in-house patient safety workshops during past year										
Yes	6224	(69.3)	5427	(71.6)	73	(71.6)	485	(56.0)	239	(54.6)
No	2621	(29.2)	2035	(26.9)	29	(28.4)	367	(42.4)	190	(43.4)
N/A	138	(1.5)	115	(1.5)	0	(0.0)	14	(1.6)	9	(2.1)
Perceived reliability of supervisor when problems arose										
Very reliable/Quite reliable	4206	(46.8)	3644	(48.1)	35	(34.3)	375	(43.3)	152	(34.7)
Unreliable/Somewhat reliable	4684	(52.1)	3849	(50.8)	66	(64.7)	486	(56.1)	283	(64.6)
N/A	93	(1.0)	84	(1.1)	1	(1.0)	5	(0.6)	3	(0.7)
Job satisfaction										
Satisfied/Somewhat satisfied	5594	(62.3)	4869	(64.3)	46	(45.1)	462	(53.3)	217	(49.5)
Dissatisfied/Somewhat dissatisfied	3305	(36.8)	2632	(34.7)	55	(53.9)	399	(46.1)	219	(50.0)
N/A	84	(0.9)	76	(1.0)	1	(1.0)	5	(0.6)	2	(0.5)
Total	8983		7577		102		866		438	

N/A: no answer

Table 2 Associations of compliance classification with participant characteristics[§]

	Intentional violators (understanding and noncompliance)			Overconfident workers (non-understanding and compliance)			Reckless workers (non-understanding and noncompliance)		
	OR	CI	P	OR	CI	P	OR	CI	P
Profession									
Nurse	1.00			1.00			1.00		
Nursing aide/Care worker	0.19	(0.03-1.42)	0.11	0.54	(0.36-0.81)	<0.01*	1.13	(0.71-1.81)	0.60
Physician	1.24	(0.49-3.12)	0.65	1.25	(0.90-1.75)	0.19	2.21	(1.42-3.44)	<0.01*
Clerk	0.99	(0.43-2.27)	0.97	0.92	(0.70-1.21)	0.56	1.33	(0.91-1.94)	0.14
Others	0.77	(0.37-1.63)	0.50	0.92	(0.71-1.19)	0.54	1.50	(1.06-2.12)	0.02*
Years of experience in specialty or profession									
1-5	1.00			1.00			1.00		
6-10	1.25	(0.71-2.18)	0.44	0.70	(0.57-0.86)	<0.01*	0.82	(0.63-1.08)	0.17
11-20	0.97	(0.54-1.72)	0.91	0.54	(0.43-0.67)	<0.01*	0.68	(0.51-0.90)	0.01*
≥21	0.64	(0.29-1.39)	0.26	0.36	(0.26-0.49)	<0.01*	0.48	(0.32-0.72)	<0.01*
Gender									
Male (vs. Female)	1.51	(0.82-2.76)	0.18	1.49	(1.20-1.84)	<0.01*	1.02	(0.76-1.37)	0.88
Working hours per week									
<40	1.00			1.00			1.00		
40-60	1.67	(0.95-2.93)	0.07	0.96	(0.80-1.15)	0.67	0.95	(0.74-1.21)	0.65
≥60	0.97	(0.38-2.46)	0.94	1.30	(0.97-1.73)	0.08	1.23	(0.83-1.82)	0.30
Number of night shifts in a month									
0	1.00			1.00			1.00		
1-4	1.39	(0.73-2.65)	0.31	0.71	(0.57-0.89)	<0.01*	0.86	(0.63-1.17)	0.34
5	2.02	(1.04-3.94)	0.04*	0.80	(0.63-1.01)	0.06	1.18	(0.86-1.63)	0.31
"We have enough staff to handle the workload."									
Strongly agree/Agree	1.00			1.00			1.00		
Neither agree nor disagree	0.83	(0.43-1.60)	0.57	1.19	(0.95-1.49)	0.13	0.95	(0.69-1.31)	0.76
Strongly disagree/Disagree	0.90	(0.52-1.57)	0.71	1.20	(0.98-1.48)	0.08	1.33	(1.01-1.75)	0.04*
Participation in in-house patient safety workshops during past year									
Yes (vs. No)	0.92	(0.54-1.56)	0.74	0.54	(0.45-0.65)	<0.01*	0.49	(0.39-0.63)	<0.01*
Perceive reliability of supervisor when problems arose									
Unreliable/Somewhat reliable (vs. Very reliable/Quite reliable)	1.96	(1.18-3.27)	0.01*	1.11	(0.94-1.32)	0.23	1.62	(1.27-2.06)	<0.01*
Job satisfaction									
Dissatisfied/Somewhat dissatisfied (vs. Satisfied/Somewhat satisfied)	1.67	(1.03-2.71)	0.04*	1.48	(1.24-1.77)	<0.01*	1.65	(1.30-2.08)	<0.01*

OR: odds ratio, CI: confidence interval

*: $P < 0.05$

[§]: Results of generalized linear mixed model (GLMM). The reference category was safe worker. The predictive value of the classification using the GLMM was 84.7%.

(OR, 1.96). The OR for being an overconfident worker was significantly higher for male health care workers (OR, 1.49) and significantly lower when workers had long experience in their specialty or profession (ORs: 0.36 for ≥ 21 years, 0.54 for 11-20 years, and 0.70 for 6-10 years) or had participated in in-house patient safety workshops during the year before the survey (OR, 0.54). The OR for being a reckless worker was significantly higher for physicians (OR, 2.21), for workers at hospitals with insufficient staff to han-

dle the workload (OR, 1.33), and for workers who reported that their supervisor was unreliable when problems arose (OR, 1.62) and significantly lower when they had long experience in their specialty or profession (ORs: 0.48 for ≥ 21 years and 0.68 for 11-20 years) and when they had participated in in-house patient safety workshops during the year before the survey (OR, 0.49). Being an intentional violator, overconfident worker, or reckless worker was associated with increased risk of low job satisfaction (ORs: 1.67

for intentional violators, 1.48 for overconfident workers, and 1.65 for reckless workers).

Discussion

Job satisfaction and perceived reliability of the supervisor were associated with being an intentional violator or reckless worker. The number of night shifts worked in a month was associated with being an intentional violator. Being a physician, perception of inadequate staffing, and participation in in-house patient safety workshops during the previous year were associated with being a reckless worker.

Lack of understanding of and noncompliance with manuals and rules were associated with job satisfaction. Gershon et al reported that health care workers with high job satisfaction were more likely to comply with universal precautions.⁸⁾ The reasons for this effect are unknown, but increased job satisfaction may improve understanding of and compliance with manuals and rules.

Perceived supervisor reliability when problems arose was associated with being an intentional violator and a reckless worker, but the effect may vary according to the type of problem encountered. Previous studies reported that patient safety culture, particularly supervisors' attitudes toward patient safety activities and rule compliance, was associated with front-line staff's compliance with manuals and rules.^{4,9)} Future studies should investigate the relationship between perceived supervisor reliability and noncompliance with manuals and rules.

Number of night shifts worked in a month was associated with being an intentional violator. No previous study has identified an association between night-shift work and noncompliance. Limited monitoring and supervisor support and inadequate staffing are frequent during night shifts, and previous studies showed that these factors are associated with rule violations.^{3,8-11)} Future studies should attempt to determine why night-shift work is associated with intentional violation of manuals and rules.

Being a physician was associated with being a reckless worker. Some studies reported that compliance with manuals and rules was lower for physicians than for nurses because of their high workload and individualism and the lack of systematization.^{12,13)} Further study of the barriers to physician understanding of and compliance with manuals and rules is needed.

A perception of insufficient staffing was associated with being a reckless worker. Manpower shortage is a known

risk for rule violations.^{10,11)} Manpower shortages can result in heavy workloads, time pressure, and reliance on unauthorized time-saving measures at work. Saving time, energy, or effort can be a motive for violating rules.³⁾ In addition, manpower shortages may limit opportunities for new employees to become knowledgeable about manuals or rules and may compel them to work with insufficient knowledge of such manuals and rules. Future studies should investigate the relationship between appropriate staffing and rule violations, because staffing levels considered appropriate by administrators may differ from workers' perceptions of adequate staffing.

Participation in in-house patient safety workshops during the year before the survey and long work experience were associated with decreased risks of being a reckless worker and overconfident worker. These factors may improve understanding of manuals and rules and lower the risk of being a reckless worker or overconfident worker, because such workers may have a limited understanding of manuals and rules. The rate of health care worker participation in in-house patient safety workshops should be improved, and effective educational content and models should be developed in order to improve understanding of manuals and rules. In contrast to our study, many previous studies reported lower compliance among health care workers with long experience because experienced workers may lack state-of-the-art training emphasizing patient safety, may be able to change treatment procedures according to the severity of a patient's condition or might resent insufficient appreciation of their experience and skills.^{6,14,15)} Health care workers with long experience may have sufficient skills and knowledge to change procedures in order to save time or improve patient outcomes. Future studies should identify the reasons for the discrepancy between the present and past results.

Being male was associated with being an overconfident worker. Risk-taking behavior is more frequent among men than among women, and a person who engages in such behavior is more likely to violate rules and regulations.^{16,17)} In some cases, men tend to exhibit risk-taking behavior when they believe the benefits of violating the rules outweigh the costs of studying and complying with the rules.⁴⁾ However, overconfident workers exhibit a contradiction because they believe they are complying with manuals and rules, although they acknowledge their insufficient understanding of manuals and rules. The reasons for overconfidence and this apparent contradiction are unknown, but

such respondents may have been confused while answering the questions, because of the excessive number of manuals and rules to understand and comply with in a hospital.

Limitations

This study was cross-sectional; thus, causation cannot be established. The respondents' understanding and compliance with manuals and rules were assessed subjectively. In our study, a concrete example of a written guideline or rule was not provided in the questions, and respondents' answers may thus have differed in relation to the manuals and rules they had experienced. In addition, some studies reported a relation between rule violations and the perceived appropriateness of a rule.²⁾ The appropriateness of each manual or rule therefore needs to be evaluated. Further studies should attempt to collect data related to understanding of and compliance with a particular manual or rules. Finally, some of our findings may be regarded as hypothesis-generating and should therefore be interpreted with caution.

Conclusions

Compliance among health care workers was associated with job satisfaction, perceived reliability of supervisors, number of night shifts worked in a month, being a physician, perception of staffing, and participation in in-house patient safety workshops during the previous year. The associations of these factors with understanding of and compliance with manuals and rules should be investigated by means of focus group interviews of intentional violators and reckless workers.

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The authors declare that they have no competing interests.

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