

A QUESTIONNAIRE-BASED SURVEY OF SAFETY CULTURE IN JAPANESE HOSPITALS

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The present paper reports the results of a questionnaire-based survey of safety culture in Japanese hospitals. Approximately 600 responses have been collected from physicians, nurses and pharmacists working in five hospitals. The questionnaire has been adapted from Helmreich's "Operating Room Management Attitudes Questionnaire" and contains, in addition, questions about respondents' reporting of their own errors and their information to patients who have suffered adverse events. We compared incident reporting statistics and questionnaire responses and have found that several safety culture aspects, particularly acknowledgement of human errors and power distance, are correlated with the actual reporting rate of incidents.

INTRODUCTION

It is widely recognised that human error is the predominant cause of accidents not only in human-machine system operations, e.g., aviation, maritime operations, and in nuclear power plants, but also in health care (Kohn et al., 1999). Similarly, in recent decades, organisational factors have been recognised to be of great importance for safe operations (e.g., Reason, 1997). Thus, it has been observed that organisational problems are frequently latent causal factors that contribute to the occurrence of human errors made by frontline personnel. Similarly, it has been pointed out that the dominant type of *contributing* causes of major accident involve the organisations that themselves shape the safety culture or climate (e.g., Reason, 1997).

In an influential publication by the IAEA, *safety culture* was defined as "... that assembly of characteristics and attitudes in organisations which establishes that, as an overriding priority, ... safety issues receive the attention warranted by their significance" (INSAG, 1993). In other words, safety culture is coupled not only to management's commitment to safety, its communication style and the overt rules for reporting errors but also to employees' motivation, morale, perception of errors and attitudes towards management and factors that impact on safety such as fatigue, risk taking and violations of rules and procedures (Andersen, 2002).

To study the relationship between safety culture and operational safety, a number of projects have been conducted to uncover individual organisation's safety culture in high-tech industries such as aviation, maritime, railway and process control industries. Such studies are typically based

on the assumption that the quality and safety with which operators accomplish their tasks are affected not only by their professional technical competence and skills but also by their attitudes to and perceptions of their jobs, their organisation and management (e.g., Helmreich & Merrit, 1998). For example, operators' attitudes have been found to be important indices of safety performance shown to correlate with incident/accident rates in railway operations (e.g., Itoh et al., 2000).

In the present study, we identify characteristics of safety culture in Japanese health care and its correlation with patient safety, applying a *questionnaire-based survey*. As part of the survey, we also seek to uncover physicians' and nurses' attitudes to reporting incidents and own errors and to informing patients who have been injured by medical error. These data have in turn been compared with the data on the other elements of safety culture as well as with the incident reporting rates, i.e., rates of staff's adverse incidents and rates of their informing the patient about an event, obtained independently from one of the hospitals surveyed. Based on the integrated results of the questionnaire survey, we briefly discuss some current issues of safety culture in Japanese hospitals as well as factors that jeopardise patient safety.

QUESTIONNAIRE AND RESPONDENTS

The questionnaire comprises five parts and has an additional demographic section where respondents fill in their department or ward specialty, position, experience and age group. Four of the five parts of the questionnaire have been adapted from Helmreich's "Operating Team Resource Management Survey" (Helmreich & Merritt, 1998). We have transformed terms and statements from the original

"Operating Room Management Attitudes Questionnaire" to fit the working situation of doctors, nurses and pharmacists working not only in the operating room but also in other types of departments and wards, keeping the same meaning and intention for each question. Finally, the questionnaire has been translated into Japanese.

The present paper focuses on results from only the first part of the questionnaire. This part contains 57 questions about perceptions of hospital management as well as general questions that may have a correlation with safety performance. Respondents are asked to rate each question on a five-point Likert scale between 1 and 5 (from 'strongly disagree' to 'strongly agree'). These question items can be largely classified into several groups in terms of organisational and human aspects that form safety culture. In this study, with reference to the original classification by Helmreich & Merritt (1998), we arranged all the items into nine categories of distinct "safety culture aspects": (1) power distance, (2) communication, (3) teamwork, (4) recognition of own performance under high stress, (5) stress management for team members, (6) morale and motivation, (7) satisfaction with management, (8) recognition of human error, and (9) awareness of own competence.

Each category involves several items. For example, the category, power distance comprises twelve items among which the following examples illustrate the format and style of the questions: "The senior person should take over and make all the decisions in life-threatening emergencies"; "Senior staff deserve extra benefits and privileges"; and "Doctors who encourage suggestions from team members are weak leaders."

The questionnaire was distributed to physicians, nurses and pharmacists working in five hospitals located in different areas in Japan. A total of 66, and 486 and 43 responses were obtained from physicians, nurses and pharmacists, respectively. The mean response rate was 91% across the three groups.

PROFESSIONAL CULTURE OF MEDICINE

Category-based responses

Percentage agreement and disagreement as well as mean scores for each of the safety culture aspects mentioned in the last section are shown in Table 1 across the three professional groups. The percentage [dis]agreement is defined as the following rate: the nominator represents 5 and 4 responses, i.e., "strongly agree" and "slightly agree" [the 1 and 2 responses, i.e., "strongly disagree" and "slightly disagree"]; and the denominator represents the total number of responses for the specific items of each aspect. Before calculation of these indices, items that represent negative meaning in terms of the aspect have their ratings of agreement reversed, i.e., 5 and 4 responses, reversed to 1 and 2, and vice versa. This table includes significance levels

(chi-square value) of differences between the professional groups.

Table 1 Percentage (dis)agreement and mean score for safety culture aspects

Safety culture aspects	Doctors	Nurses	Pharma.	Total	χ^2
I Power distance	% agree.: 30.4% %disagree.: 59.7% Mean score: 2.54	21.8% 60.4% 2.43	27.6% 59.2% 2.44	23.2% 60.3% 2.45	0.88
II Communication	88.1% 4.9% 4.37	85.9% 3.8% 4.27	89.4% 2.9% 4.41	86.4% 3.9% 4.29	14.75**
III Teamwork	57.6% 26.0% 3.44	65.0% 15.7% 3.68	55.2% 24.8% 3.43	63.5% 17.5% 3.64	16.17**
IV. Own performance under high stress	49.2% 38.1% 3.14	41.0% 35.7% 3.07	42.6% 32.9% 3.15	42.0% 35.8% 3.08	3.92
V. Stress management for team member	69.5% 19.8% 3.73	69.4% 15.8% 3.75	66.8% 21.6% 3.55	69.2% 16.6% 3.73	5.12
VI Morale & motivation	72.9% 16.0% 3.91	65.7% 15.1% 3.73	65.9% 18.5% 3.73	66.5% 15.4% 3.75	14.75**
VII. Satisfaction with management	45.5% 39.6% 3.07	51.3% 28.8% 3.30	51.7% 31.7% 3.31	50.7% 30.1% 3.28	10.40**
VIII Recognition of human error	60.6% 26.3% 3.56	60.7% 21.3% 3.64	55.4% 28.6% 3.49	60.3% 22.4% 3.62	2.32
IX Awareness of own competence	58.2% 27.1% 3.46	44.8% 24.8% 3.28	40.2% 30.9% 3.12	46.0% 25.5% 3.29	17.52**

** $p < 0.01$, * $p < 0.05$

The main general results show that hospital staff has a relatively high morale and motivation, and that they exhibit good awareness of communication among teams, members and their organisation. Their satisfaction with teamwork is also relatively high; and in particular, nurses' perception of the value of teamwork is the highest, two thirds of nurses having a positive attitude to this aspect. Compared to these three aspects, percentage agreement in terms of satisfaction with management is not high, and physicians' satisfaction is significantly the lowest of the three professional groups in health care.

One of the safety culture aspects is power distance: this refers to the psychological distance between leaders or superiors and subordinate members: A smaller distance reflects, for example, that leaders and their subordinates have open communication initiated not only from leaders but also, more critically, from juniors. The results shown in Table 1 indicate that a relatively small power distance seems to exist in Japanese hospitals; in addition, there is no significant difference in perception of this aspect between physicians, nurses and pharmacists.

A large part of medical staff has realistic attitudes to and a realistic recognition of human error. That is, they recognise that "human error is inevitable," and they do not agree with the question "errors are a sign of incompetence".

Table 2 Ward-based nurse groups' reporting rates of incidents

Wards	Types of incidents					Report rate to system (/person/yr)	Inform. rate to pt.(%)	Rate of Level 2+ case (/person/yr)
	Injection	Oral intake	Fall	Misuse of equipment	Others			
Internal medicine	40.4%	22.9%	12.8%	25.7%	-	1.79	36.7%	0.13
Surgery	35.5%	14.5%	27.6%	22.4%	-	1.27	47.4%	0.00
Outpatient	23.6%	4.2%	4.2%	61.1%	6.9%	0.97	44.4%	0.05
Operating room	10.9%	-	-	48.9%	40.2%	4.60	6.5%	0.20
Mixed ward	31.7%	18.7%	24.5%	25.2%	-	1.62	48.2%	0.08
Total	28.7%	13.3%	14.8%	34.6%	8.6%	1.62	37.9%	0.08

Regarding attitudes to stress, a large part of medical staff recognise the need for monitoring colleagues' levels of stress and workload. For example, more than 90% of respondents agreed that team members should be monitored for signs of stress and fatigue during task. In contrast, respondents do exhibit any great awareness of the effects of stress on their own performance. More than half of physicians, and one third of the nurses disagreed with the item "I am more likely to make errors or mistakes in tense or hostile situations". Similarly, only 5% of physicians agreed that their performance is reduced in a stressed or fatigued situation (89% disagreement). Percentage disagreement – and a bit lower at 78% for nurse.

INVESTIGATION OF INCIDENT REPORTING

Incident Statistics

A statistical summary of incident reports submitted from nurses only was obtained from one of the hospitals surveyed in this study. The summary includes the number of incidents reported during the previous year (April 2000 – March 2001) based on incident types as well as the number of cases that have been fallen into Level 2 or higher severity level of outcome. In most Japanese hospitals, accidents and incidents are classified into six levels in terms of outcome severity from 0 (near-miss) to 5 (death). Usually cases at Levels 0 and 1 are regarded as incidents, and ones at Level 2, where a patient's vital signs have been changed by an event and an additional inspection is to be required – though those are actually not accidents –, or at higher level are noticed as accidents. Table 2 shows a summary of ward-based reporting rates that includes three indices on incident reporting as well as the percentage of each type of incident: (1) reporting rate to the system, i.e., the rate of incidents of the given type submitted to the hospital's reporting system per nurse in a year, (2) the rate of informing the patient, i.e., calculated by dividing the number of acts of informing the patient about the event by the total number of reported cases, and (3) the rate of cases at Level 2 or higher, i.e., the rate of reported

Level 2+ cases per nurse in a given year.

As can be seen in Table 2, the reporting rate to the system varies across the wards. The reporting rate from the operating room was the highest of all the wards in this hospital. Nurses working for outpatient and in the surgical ward submitted incident reports less frequently than those in the other wards. This may suggest that the likelihood of incident occurrence basically depends on the type of medical treatments and nurses' activities. The rank of the ward in this index is correlated with the rate of Level 2+ cases ($r=0.867$).

Correlation between Safety Culture and Reporting Rates

We examined correlations between the nurses' questionnaire response to safety culture aspects and the actual rates of reporting to the system and of informing to the patient. For this purpose, questionnaire responses were rearranged only for nurses in the hospital from which we obtained the summary of incident reports. The percentage agreements and mean scores were calculated based both on the ward and on the position for each safety culture aspect derived from the safety culture related questions.

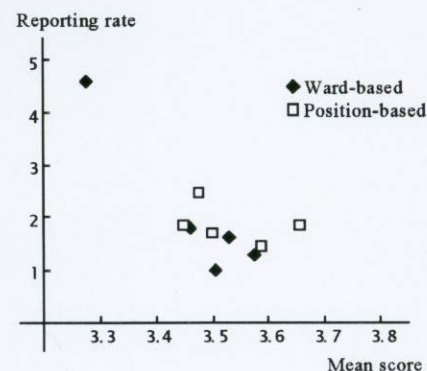


Figure 1 Correlation between rate of incident reporting and recognition of human error

Figure 1 shows the graph plotting for all the ward- and the position-based nurse groups in terms of the actual reporting rate to the system and mean score of questionnaire responses to one of the safety culture aspects, recognition of

human error. As can be seen in this figure, the actual rate of incident reporting is negatively correlated with the recognition level of human error ($r=-0.944$; $p<0.01$). This indicates that the more realistic nurses' recognition towards human errors becomes, the less frequently an incident report is brought up. As not mentioned in the present paper, the actual rate of incident reporting may serve to measure accident risk in *this* hospital, based on a discussion of its relationship with the nurse's response to willingness to report errors (Itoh et al., 2002). According to this view, it may be suggested that realistic recognition of human error contributes to a lower risk of adverse events in a hospital.

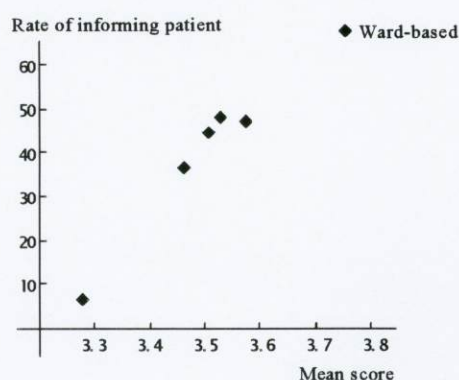


Figure 2 Correlation between rate of informing patient and recognition of human error

Figure 2 shows a ward-based correlation between the rate of informing the patient and recognition of human error. As can be seen in this figure, this safety culture aspect is also correlated with the nurse's willingness to explain an event to the patient ($r=0.983$, $p<0.01$). It is natural to interpret this result as indicating that a realistic recognition of human errors facilitates the willingness to inform the patient.

CONCLUSION

This paper reported the integrated results from a questionnaire-based survey of safety culture related attitudes among health care staff and analysis of the rates of incident reporting in Japanese hospitals. A major outcome of the present survey has been to obtain a hypothesis concerning correlations between the actual reporting statistics and some of the safety cultural aspects, e.g., recognition of human fallibility, and power distance – though the latter aspect has not mentioned here –, for further investigations. In particular, the survey results seem to indicate that a nurse group who has a relatively larger power distance and unrealistic recognition of human errors will be liable to produce a greater number of incidents. Therefore, in addition to the

importance of a realistic recognition of human error potentials, we hypothesise that a relatively small psychological distance between superiors and subordinate members and open communications within an organisation and among team members may be one of the key factors for establishing and maintaining a safe medical organisation.

Finally, we suggest that efforts be devoted to examining statistical correlations of the actual incident rates with the perceptions and views of health care staff about safety culture aspects. The questionnaire-based method may be a useful supplement to accident/incident data in order to identify high and low risk work units in the medical domain. This is of importance whenever incident reporting is incomplete or when reporting criteria are heterogeneous. Equally, while incident reporting is a retrospective index of safety levels, the survey data may be used prospectively.

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