A National Survey on Healthcare Safety Culture in Japan: Analysis of 20,000 Staff Responses from 84 Hospitals

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1. INTRODUCTION
During the last decade, hospital managers in Japan have been making strong efforts to reduce medical mistakes and accidents by seeking to improve structural factors that impact on patient safety, e.g., equipment, procedures, routines, and work conditions. At the same time, it has also been recognised that the safety performance of a healthcare organisation may be influenced not only by safety structure but also by safety culture or climate.

In our previous survey that collected about 6,000 responses from Japanese doctors, nurses and pharmacists [3], safety culture related attitudes and perceptions among hospital staff were investigated along with various sources of cultural differences. However, the generalizability of the results of the previous survey to the general situation in Japanese hospitals may be still questioned due to a relatively small number of doctor and hospital pharmacist responses (391 and 199 responses, 11 hospitals). A new survey was therefore planned, which might also reveal to which extent changes have taken place in safety climate in Japanese hospitals as a result of recent strongly promoted patient safety campaigns.

The present paper reports results of a questionnaire-based survey of safety culture collected more than 20,000 staff responses from a number of Japanese hospitals. The study aims at identifying basic characteristics of safety culture in Japanese healthcare, including differences in professional, regional and organisational cultures.

2. QUESTIONNAIRE
The survey was carried out in 2006 and received 21,666 responses (84% mean response rate) from 84 hospitals in all regions of Japan – confer Table 1.

Items of the "safety culture" section of the questionnaire were adapted from the instrument used for "Operating Team Resource Management Survey" developed by Helmreich [1]. Respondents were asked to indicate their level of agreement or disagreement on a five-point Likert scale with each of 57 statements about attitudes to and perceptions of their job, hospital management, and factors that might impact on safety performance. The items were the same as those used in the previous surveys made in 2001 [2] and 2002 [3].

Table 1: Distribution of responses

Profession	No. of hospitals	No. of responses	Response rate
Nurse	41	17,858	88%
Doctor	83	1,005	51%
Pharmacist	51	542	48%
Technician	50	1,934	89%
Others/NA	-	327	-
Total	84	21,666	84%

3. RESULTS

3.1 Safety Culture Factors
The principal component analysis was applied to all responses of the survey sample to develop a construct of safety culture, i.e., safety culture (SC) factors, as an analysis framework. Results of the analysis are shown in Table 2, including labelling, variance accounted, Cronbach's alpha and highly loaded items and their loadings for each principal component. Twelve factors – all their eigenvalues were higher than 1.0 – were elicited with 44.3% of cumulative variance accounted for. This construct includes all the nine factors, which were identified by reference to the original classification by Helmreich & Merritt [1], in the previous studies [2, 3].

3.2 Overall Trend in Japanese Hospitals

3.2.1 Professional cultures in healthcare
Percentage agreement and disagreement for each safety culture factor are shown in Table 3 across the four professional groups as well as results of the Kruskal-Wallis test. The percentage [dis]agreement is computed as follows: Before calculation of the indices, an item that has a negative factor loading for a given factor had its figure reversed, i.e., 5 and 4 responses were revealed to 1 and 2, and vice versa. A mean score of each factor is

Table 2. Safety culture factors elicited by principal component analysis

SC factors [Var. (cumul.)] (Cronbach's α)	Items highly loaded	Load-ing
I. Recognition of Communication [4.9% (4.9%)] α = 0.669	● Team members should verbalise plans and be sure information is understood by others.	0.700
	● Regular debriefing after critical activity or shift is important for effective team coordination.	0.666
	● Pre-session team briefing is important for patient safety and effective team management.	0.620
	● To resolve conflicts, team members should openly discuss their differences.	0.490
II. Morale & Motivation [4.8% (9.7%)] α = 0.737	● I like my job.	0.730
	● I am proud to work for this hospital.	0.714
	● I enjoy working as part of a team.	0.706
	● Working for this hospital is like being part of a large family.	0.545
III. Power distance [4.8% (14.5%)] α = 0.627	● Successful hospital management is primarily function of doctor's medical proficiency.	0.566
	● Team members should not question senior staff except when they threaten safety.	0.560
	● Junior team members should not question decisions made by senior staff.	0.526
	● Only people qualified to give me feedback are others of my own profession.	0.523
	● It is better to agree with other team members than to voice a different opinion.	0.485
	● Doctors who encourage suggestions from team members are weak leaders.	0.456
IV. Recognition of stress effects on own performance. [4.4% (18.9%)] α = 0.625	● I am more likely to make errors in hostile situations.	-0.646
	● My decision-making is as good in emergencies as in routine situations.	0.635
	● Even when fatigued, I perform effectively during critical phases.	0.606
	● In critical situations, I rely on my superiors to tell me what to do.	-0.454
	● Personal problems can adversely affect my performance.	-0.445
	● I am less effective when stressed or fatigued.	-0.441
	● Professional member can leave personal problems behind during task performance.	0.325
V. Trust in management [4.0% (22.9%)] α = 0.624	● The department provides adequate, timely information about events in the hospital.	0.669
	● Mistakes are handled appropriately in my hospital.	0.666
	● The concept of all personnel working as a team does not work in our hospital.	-0.568
	● Department leadership listens to staff and cares about our concerns.	0.528
VI. Safety awareness [3.6% (26.5%)] α = 0.540	● I always ask questions when I feel there is something I don't understand.	0.593
	● I let other team members know when my workload is becoming excessive.	0.522
	● Team members share responsibility for prioritising activities in high workload.	0.482
	● I will speak up patient management problem, regardless of who might be affected.	0.480
	● I am encouraged to report any incidents I may observe.	0.408
VII. Awareness of own competence [3.3% (29.8%)] α = 0.576	● I value compliments about my work.	0.705
	● Good reputation of professional activities is important to me.	0.526
	● It is important that my competence be acknowledged by others.	0.494
	● All team members are qualified to give me feedback.	0.357
	● It bothers me when others do not respect my professional capabilities.	0.305
	● I get the respect that person of my profession deserves.	0.279
VIII. Collectivism-individualism [3.3% (33.0%)] α = 0.463	● I care that others see me as friendly and cooperative.	0.650
	● I am ashamed when I make a mistake in front of other team members.	0.488
	● I sometimes feel uncomfortable telling members from other disciplines to take actions.	0.445
	● I try to be a person that others will enjoy working with.	0.443
	● As long as work gets done, I don't care what others think of me.	-0.405
IX. Cooperative-ness [3.1% (36.1%)] α = 0.430	● I become irritated when I have to work with inexperienced staff.	0.682
	● My performance is not adversely affected by working with inexperienced team member.	-0.565
	● It is an insult to be forced to wait unnecessarily for other members.	0.517
X. Recognition of stress management for team members [2.9% (39.0%)] α = 0.466	● Own psychological stress or physical problems should be obliged to mention to others.	0.563
	● Team members should monitor each other for signs of stress or fatigue.	0.507
	● We should be aware of the personal problems of other team members.	0.468
	● Personalities of members should be taken into account for effective team coordination.	0.233
XI. Seniority dependency [2.8% (41.8%)] α = 0.405	● Senior staff deserves extra benefits and privileges.	0.610
	● Senior person should take over and make all decisions in life-threatening emergencies.	0.546
	● Senior staff should encourage questions from junior staff during task performance.	0.536
XII. Recognition of human error [2.5% (44.3%)] α = 0.283	● Human error is inevitable.	0.667
	● Errors are a sign of incompetence.	-0.254

calculated across all the specific items for each respondent, and the degree of agreement is classified into five levels based on its score: (1) strong disagreement [1.0, 1.5]; (2) weak disagreement (1.5, 2.5]; (3) neutral (2.5, 3.5); (4) weak agreement [3.5, 4.5]; and (5) strong agreement [4.5, 5.0]. The percentage [dis]agreement is represented as a proportion of respondents expressing strong [dis]agreement or weak [dis]agreement for a specific safety culture factor.

Table 3. Differences across professional groups

SC factors	Dr.	Ns.	Phar.	Tech.	$\chi 2$
I. Recognition of communication	95%	95%	96%	98%	188.05***
	0%	0%	0%	0%	
II. Morale & Motivation	65%	47%	54%	60%	341.66***
	9%	19%	15%	11%	
III. Power distance	1%	1%	1%	2%	86.51***
	84%	82%	87%	78%	
IV. Recognition of stress effects	19%	24%	28%	17%	129.23***
	19%	10%	9%	14%	
V. Trust in management	56%	58%	44%	43%	255.88***
	14%	11%	23%	21%	
VI. Safety awareness	57%	73%	59%	58%	393.36***
	3%	1%	3%	3%	
VII. Awareness of own competence	50%	32%	35%	34%	152.76***
	6%	12%	12%	10%	
VIII. Collectivism -individualism	52%	58%	53%	53%	60.06***
	4%	2%	3%	3%	
IX. Cooperative-ness	15%	23%	18%	25%	128.00***
	34%	19%	25%	20%	
X. Recognition of stress anagement	84%	81%	76%	80%	23.93***
	1%	1%	2%	2%	
XI. Seniority dependency	85%	55%	69%	69%	769.88***
	1%	7%	2%	4%	
XII. Recognition of human error	90%	81%	88%	83%	226.55***
	1%	4%	2%	3%	

Upper row: % agreement, Lower row: % disagreement.

*: $p < 0.05$, **: $p < < 0.01$, ***: $p < 0.001$

There were significant differences between doctors, nurses, pharmacists and technicians for all the safety culture factors. Yet, some common trends of safety culture were observed across these professional groups: most of Japanese healthcare employees indicate positive perceptions of communication within their organisations as well as of stress management for team members, and the perceived power distance is relatively small. Similarly, all respondents in all groups showed modest recognition of stress effects on their own performance. In particular, less than 20% of doctors and technicians exhibited realistic recognition of stress effects during work.

Among the differences between the groups, one may notice that doctors indicated a much higher level of morale and motivation, awareness of own competence, and attitudes of seniority dependency than the other professional groups. Also, nurses' safety awareness was far stronger than that of the other groups, and they were more liable to express collective or team-oriented attitudes.

3.2.2 Differences among doctors' specialties

Percentage agreements and disagreements with each safety culture factor are shown in Table 4 for the doctor across clinical specialties. Again, we carried out Kruskal-Wallis tests between three specialties, i.e., physicians (internal medicine; N=362), surgeons (N=413) and anaesthesiologists (N=57), for each of the 12 safety culture factors, please confer Table 4.

Table 4. Comparison across specialties: Doctors

SC factors	Intern. med.	Surge.	Anae.	Total	$\chi 2$
I. Recognition of communication	94%	95%	91%	95%	1.03
	0%	0%	0%	0%	
II. Morale & Motivation	64%	66%	57%	65%	4.37
	9%	8%	16%	9%	
III. Power distance	1%	1%	2%	1%	3.55
	86%	84%	82%	84%	
IV. Recognition of stress effects	22%	16%	7%	19%	10.00*
	17%	24%	22%	19%	
V. Trust in management	55%	61%	40%	56%	10.14*
	12%	14%	23%	14%	
VI. Safety awareness	53%	61%	60%	57%	4.48
	3%	2%	4%	3%	
VII. Awareness of own competence	47%	51%	60%	50%	3.83
	7%	5%	2%	6%	
VIII. Collectivism-individualism	54%	51%	36%	52%	6.37*
	5%	4%	2%	4%	
IX. Cooperativeness	14%	15%	16%	15%	0.18
	34%	33%	32%	34%	
X. Recognition of stress mgt.	84%	84%	91%	84%	3.09
	1%	1%	0%	1%	
XI. Seniority dependency	84%	86%	82%	85%	3.33
	1%	0%	4%	1%	
XII. Recognition of human error	90%	91%	88%	90%	1.36
	1%	2%	0%	1%	

Upper row: % agreement, Lower row: % disagreement.

*: $p < 0.05$, **: $p < < 0.01$, ***: $p < 0.001$

Significant differences were found for only three factors: recognition of stress effects on own performance, trust in management, and collectivism-individualism; and, moreover, only a few differences were observed for these factors: e.g., anaesthesiologists' recognition of stress effects on own performance was less realistic; they were less liable to take team-oriented attitudes; and their trusts in management were much weaker than physicians and surgeons. The results suggest that "professional" safety culture of anaesthesiologists in Japan is slightly more negative than the other specialty groups.

Table 5. Nurses' ward-based comparisons in safety culture

SC factors	Intern. med.	Surge.	ICU	OR	Outpt.	Psychi.	Paedia.	Mixed	Total	$\chi 2$
I. Recognition of Communication	95%	95%	96%	96%	97%	95%	95%	95%	95%	99.90***
	0%	0%	0%	1%	0%	0%	0%	0%	0%	
II. Morale & Motivation	45%	44%	41%	44%	57%	52%	45%	45%	47%	196.59***
	21%	19%	24%	22%	13%	16%	17%	21%	19%	
III. Power distance	1%	1%	1%	1%	1%	1%	0%	1%	1%	36.35***
	83%	82%	83%	82%	79%	81%	81%	86%	82%	
IV. Recognition of stress effects on own performance	26%	27%	27%	25%	14%	20%	25%	25%	24%	278.96***
	9%	8%	10%	11%	15%	13%	11%	10%	10%	
V. Trust in management	61%	60%	54%	51%	52%	58%	66%	59%	58%	148.63***
	10%	9%	13%	17%	14%	13%	7%	11%	11%	
VI. Safety awareness	72%	73%	71%	70%	75%	73%	77%	75%	73%	29.94***
	1%	1%	1%	2%	1%	1%	1%	1%	1%	
VII. Awareness of own competence	29%	31%	32%	30%	35%	28%	29%	31%	32%	43.23***
	13%	12%	10%	11%	10%	17%	11%	11%	12%	
VIII. Collectivism-in dividualism	58%	60%	59%	54%	59%	51%	60%	58%	58%	40.43***
	2%	2%	2%	4%	2%	4%	2%	2%	2%	
IX. Cooperativeness	23%	23%	22%	24%	22%	27%	23%	23%	23%	28.02***
	20%	19%	20%	21%	21%	13%	16%	21%	19%	
X. Recognition of stress management for team members	80%	80%	82%	83%	84%	77%	79%	82%	81%	51.50***
	1%	2%	1%	1%	1%	2%	2%	1%	1%	
XI. Seniority dependency	53%	56%	59%	57%	55%	44%	58%	57%	55%	71.97***
	7%	6%	6%	6%	7%	11%	6%	5%	7%	
XII. Recognition of human error	81%	82%	86%	83%	75%	76%	80%	83%	81%	117.96***
	4%	3%	3%	4%	6%	7%	3%	3%	4%	

Upper row: % agreement, Lower row: % disagreement. *: $p < 0.05$, **: $p< < 0.01$, ***: $p < 0.001$

The results mentioned are slightly different from those surveyed in 2002 [2], where no significant differences among doctors belonging to different specialties were found (although this might well be due the small sample of the 2002 survey – about 200 responses, including 30 anaesthesiologist responses). The present survey suggests as an overall trend that Japanese hospital doctors share a largely homogeneous safety culture across different specialties, as also suggested in the previous study [2].

3.2.3 Differences among nurses' wards

For nurses, percentage agreements and disagreements of each ward group are shown in Table 5 for all the safety culture factors, being classified into eight groups: internal medicine (N=3,587), surgery (3,674), ICU (intensive care unit; N=1,240), operating room (N=991), outpatient (N=2,410), psychiatry (N=708), paediatrics (N=576) and mixed ward (N=2,276). In contrast to results for doctors, there were highly significant differences for all the safety culture factors across the ward groups (but again, this is to be expected when the sample is so large). Among the eight groups, two extremes stood out. One type is nurses working for outpatients. Compared to most of the other ward groups, they expressed greater agreement with importance of communication and of stress management for team members, and they indicated a higher level of morale and motivation, and stronger awareness of own competence; but in contrast, they showed less realistic recognition of their own performance limitations under stress and less realistic acknowledgement of human error, and, finally, a relatively lower level of trust in management. Nurses working in the operating room showed themselves similar to the outpatient group: they exhibited higher level of recognition of the importance of communication and of stress management for team members, and weaker trusts in management and lower safety awareness. However, their morale and motivation was not high unlike the outpatient nurses.

The other extreme type is paediatrics nurses. In contrast to the outpatient nurses, their morale and motivation, safety awareness, and recognition of importance of communication and that of stress management for team members were lower than most of the other ward groups, but they expressed stronger trust in management and greater level of safety awareness. The

psychiatric nurse group shared largely the same attitudes and perceptions. However, their morale and motivation was relatively high compared to other ward groups. In addition, the psychiatric nurses gave the lowest agreement of the eight ward groups with collectivism attitudes while that of the paediatrics nurses was the highest.

Compared with the results of the 2002 survey [3], we obtained almost the same results regarding differences and similarities across nurses' wards. For instance, in both surveys, the internal medicine and the surgery ward nurses were located in the middle for each factor. Similarly, the outpatient nurses' morale and motivation and awareness of their own competence were still the highest while their realistic acknowledgement of stress effects on their own performance and trusts in management remained the lowest of the eight ward groups after the four year interval. There were a largest number of nurses who expressed collectivism in the paediatrics ward and also a smallest number of nurses taking the same attitudes in the psychiatrics ward in the both surveys.

Regardless of shared trends between 2002 and 2006, however, we also identified a few differences. In the 2002 survey, power distance perceived by the outpatient nurses was smaller than most of the other ward groups. In contrast, in the present survey, their perception of this safety culture factor was the smallest although differences were small between the ward groups. Similarly, the relative rank of the importance of communication recognised by the psychiatric nurses changed markedly between 2002 and 2006. In 2002, they gave this factor a higher ranking than all other groups, but in 2006 their assessment was almost as the lowest.

One may speculate about the source of the above-mentioned different results among nurses' wards between the two surveys made in 2002 and 2006. One possibility that cannot be ruled out is sampling error: i.e., the 22 hospitals included in the 2002 sample might not be representative of hospitals in Japan in terms of staff attitudes and hospital management systems. Still, we have no reason to believe this is the case, and the 2002 set of hospitals was not unrepresentative of Japanese hospitals in terms of size, ownership or operational conditions. Another possible explanation is to invoke the fact that by around 2002 patient safety had just become a major and publicly visible issue in hospital management for Japanese healthcare organisations. The hospitals recruited for the 2002 survey volunteered after receiving our call for participation. Therefore, it might be speculated that the hospital managers who responded to our call might be more strongly involved in patient safety, and that staff awareness and concerns with patient safety may have been higher. However, the hospitals participating in both the 2002 and 2006 surveys showed the same tendency than the others.

To identify differences or similarities in safety culture across all eight wards, applying the 12 factor construct mentioned in Section 3.1 to the nurse sample of the 2002 survey (N=5,179), we made correlation analysis (Spearman's *rho*) on each safety culture factor between 2002 and 2006, using its mean scores of the eight ward groups.

Table 6. Changes in Japanese nurses' safety culture in four year interval (2002/2006)

SC factors	Hospitals						Twice-surveyed hospitals	All hospitals
	A	B	C	D	E	F		
I. Recognition of Communication	4.41*	4.34**	4.17***	4.13***	4.17***	4.23*	4.23***	4.28***
	4.51	4.47	4.42	4.35	4.36	4.30	4.39	4.37
II. Morale and Motivation	3.40***	3.08	3.15***	3.08**	3.29**	3.26**	3.19***	3.29***
	3.85	3.21	3.47	3.30	3.45	3.44	3.42	3.40
III. Power distance	2.02	2.08	2.05*	2.16***	2.03	2.23	2.22***	2.08***
	2.05	2.04	1.94	1.95	2.01	2.22	2.13	2.02
IV. Recognition of stress effects on own performance	3.08*	3.20**	3.05**	3.30	3.14	3.25*	3.18**	3.14*
	2.95	3.07	3.15	3.25	3.08	3.15	3.12	3.11
V. Trust in management	3.62	3.32	3.39***	3.55*	3.60	3.45	3.47	3.46***
	3.62	3.30	3.70	3.36	3.58	3.34	3.48	3.55
VI. Safety awareness	3.90	3.80	3.79*	3.68	3.81	3.73	3.78***	3.81***
	3.90	3.89	3.89	3.72	3.86	3.75	3.84	3.86
VII. Awareness of own competence	3.28	3.17	3.22*	3.13	3.19	3.18	3.19***	3.18***
	3.43	3.24	3.31	3.15	3.24	3.21	3.25	3.24
VIII. Collectivism-individualism	3.64	3.55*	3.38***	3.40	3.59	3.56	3.55***	3.59***
	3.73	3.64	3.55	3.67	3.61	3.62	3.62	3.62
IX. Cooperativeness	3.11*	2.90	2.99**	3.03*	3.10	2.99	3.00**	3.04***
	2.96	2.93	2.87	2.88	3.00	2.99	2.94	2.98
X. Recognition of stress management for team members	3.86	3.93	3.71**	3.78	3.79	3.81	3.81	3.79***
	3.91	3.86	3.84	3.75	3.80	3.81	3.82	3.87
XI. Seniority dependency	3.59	3.54	3.73	3.74	3.57	3.54	3.62**	3.55***
	3.50	3.43	3.72	3.62	3.56	3.46	3.55	3.59
XII. Recognition of human error	3.97	3.95*	3.95**	4.00	4.04**	3.91	3.96***	3.90***
	3.85	3.82	3.79	3.98	3.86	3.84	3.85	3.86

Upper row: Score of safety culture factor in 2006; Lower row: Score of safety culture factor in 2002
*: $p < 0.05$, **: $p < < 0.01$, ***: $p < 0.001$ between 2002 and 2006

As results of the analysis, there were significant correlations for four of the 12 safety culture factors between the two surveys: recognition of communication (*rho*=0.93, $p<0.01$), morale and motivation (*rho*=0.81, $p<0.05$), safety awareness (*rho*=0.90, $p<0.01$), and seniority dependency (*rho*=0.90, $p<0.01$). No significant correlations were observed for the other half of the safety culture factors but some of these were close to a significance level at $p<0.05$: power distance (*rho*=-0.40), recognition of stress effects on own performance (*rho*=0.52), trust in management (*rho*=0.57), awareness of own competence (*rho*=0.29), collectivism-individualism (*rho*=0.62), cooperativeness (*rho*=0.55), recognition of stress management for team members (*rho*=0.17), and recognition of human error (*rho*=0.64). These results may indicate that nurses' professional culture on patient safety elicited in this study is in a large part matched with those identified by the 2002 survey.

3.3 Climate Changes over Four Years

In this section we use the term, "climate" instead of "culture" since we now focus on changes over the shorter term. To ascertain possible changes between 2002 and 2006 we performed comparative analyses of the 12 safety culture factors, using three datasets drawn from the nurse samples, which included a sufficient number of responses for analysis. One dataset we used for this purpose was the entire nurse data, which included 17,855 (see Section 2) and 5,175 (91% response rate) responses for the 2006 and the 2002 survey, respectively. For the other dataset we selected the nurse responses from the (six) hospitals that participated in both surveys. This sample included 1625 (94% response rate) from the 2006 and 1703 (88%) nurse responses from the 2002 survey. The third and final analysis compared nurse responses across organisations between 2002 and 2006 for each of the six hospitals mentioned above.

Comparative results are summarised in Table 6 for the three datasets in terms of mean scores of each safety culture factor in 2006 and 2002 as well as levels of significance. The results from the aggregated data of the hospitals that were surveyed twice indicate significant differences in most safety climate factors in the four-year interval. It must be noticed that each hospital exhibited the same trend of safety climate change for each factor – becoming more positive or more negative – as that of the aggregated data of the twice-surveyed hospital sample. In addition, the results obtained from the entire nurse sample also showed the same trend of safety climate changes across the organisations involved.

Overall changes between 2002 and 2006 in Japanese nurses' safety climate have taken place: staff motivation and morale have decreased, and recognition of the importance of communication and safety awareness has become weaker. Moreover, nurses have become more likely to behave more individualistically – though many of them are still teamwork-oriented; and the perceived power distance has become larger. In contrast, nurses' perception of human error and the effects of stress on their own performance have become more realistic.

4. CONCLUSION

In the present paper, we have reported on the present state of safety culture in Japanese healthcare organisations based on survey results of more than 20,000 staff responses. The results of this large sample from 84 hospitals from all regions in Japan have supported most of the findings obtained in our previous survey involving a smaller sample [3]. But we also observed a few changes from 2002 to 2006.

The data collected in 2006 suggest that there are a few marked, though not great, differences in professional safety culture between doctors, nurses, pharmacists and technicians. Looking at each profession, it is noticeable that for nurses there are only minor differences in terms of safety culture across different wards, and that the differences are even smaller for doctors across specialties.

Summarising our findings, we find that the evidence provided by our two large samples from 2002 and 2006 suggest that the safety climate in Japanese hospitals slightly declined in certain dimensions in the four year interval. In particular, healthcare professionals' motivation and morale were markedly reduced. In addition, in 2006 power distance was perceived to be greater than four years earlier. In contrast, healthcare staff recognition of human error and effects of stress at work became more realistic. It may be speculated that these changes may have been brought about by the intensive hospital-wide activities to enhance patient safety that have been initiated in recent year, particularly safety training and establishment of safety-related rules and procedures including error reporting.

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