

研究成果の刊行に関する一覧表

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原著論文：英文

1. Murakami G, Imanaka Y, Kobuse H, Lee J, Goto E. Patient Perceived Priorities between Technical Skills and Interpersonal Skills: Their Influence on Correlates of Patient Satisfaction. *Journal of Evaluation in Clinical Practice* (in press)
2. Kawasaki K, Sekimoto M, Ishizaki T, Imanaka Y. Work stress and workload on full-time anesthesiologists of acute care hospitals in Japan. *Journal of Anesthesia* (in press)
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4. Sekimoto M, Imanaka Y, Kobayashi H, Okubo T, Kizu J, Kobuse H, Mihara H, Tsuji N, Yamaguchi A. Impact of hospital accreditation on infection control programs in teaching hospitals in Japan. *American Journal of Infection Control*. 2008;36(3):212-219.
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Patient perceived priorities between technical skills and interpersonal skills: their influence on correlates of patient satisfaction

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Keywords

CHAID (chi-squared automatic interaction detection) analysis, interpersonal skills, patient perceived priority, patient satisfaction, technical skills

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Abstract

Objectives The study objective was to elucidate the differences in factors related to overall patient satisfaction levels among subgroups based on whether patients placed higher priorities on technical or interpersonal skills of health care personnel.

Methods This questionnaire survey targeted 2341 patients discharged from five Japanese hospitals in 2007. Patients were grouped based on whether they prioritized technical or interpersonal skills by chi-squared automatic interaction detection (CHAID) analysis. Multiple regression analysis was used to compare and evaluate differences in various factors related to patient satisfaction among the subgroups.

Results Survey respondent rate was 55.7% (1305 patients). CHAID analysis showed that patients, in particular those warded in surgery departments, tended to place a higher value on technical skills, although paediatric and rehabilitation patients also placed a high value on interpersonal skills. While it has been shown that non-surgical patients tended to prioritize interpersonal skills, our results revealed that patients warded in the surgery department who did not undergo operations still prioritized technical skills. These variation patterns among patient subgroups were further supported by regression analysis of overall patient satisfaction. In surgical patients, the 40- to 79-year-old subgroup regarded technical skills to be more important and the role of the doctor was found to be more associated with overall satisfaction. However, even among surgical patients, older patients placed higher values on interpersonal skills, and overall satisfaction was found to be more associated with health care professionals (besides doctors) and living arrangements.

Conclusions We conclude that differences in patient satisfaction levels could be influenced by different perspectives on prioritized skills.

Introduction

Several reports and reviews have assessed the quality of inpatient treatment. Many of these examine factors related to overall patient satisfaction, and a large body of literature exists on this subject.

Results have varied widely in studies examining the impact of age on patient satisfaction. Some studies have revealed that elderly patients have a lower level of satisfaction [1,2]; some show no age-dependent differences in satisfaction with regard to technical skills [3]; others have shown a tendency for younger patients to experience higher levels of satisfaction [4]. Some studies show a tendency for younger patients to experience lower levels of satisfaction [5], and yet other studies have reported that elderly patients

actually experience a higher level of satisfaction in regards to their doctor [6]. Furthermore, various studies have found high levels of variance in patient satisfaction with relation to gender, in that some studies show higher levels of satisfaction in women [1,7], some show that men have a higher level of satisfaction [8], and others finding no relation between gender and satisfaction [3,6,9-11]. Although several factors associated with patient satisfaction have been identified [11-19], the reasons for these discrepancies remain unknown.

Some studies have examined the relationship between overall patient satisfaction and individual factors such as doctors, nurses, co-medical staff and living arrangements [1,11-16,18,19]. These studies demonstrate that satisfaction is more difficult to link to

patients' living arrangements than to the characteristics of their health care professionals, although only a few studies have measured patient satisfaction based on living arrangements. Some Japanese studies have indicated the important role of doctors in overall patient satisfaction [20,21].

Factors relevant to patient satisfaction vary depending on the patient's personal sense of values and perception [4,22], and previous studies have evaluated the impact of patient values on their satisfaction [20,21,23–26]. However, methodological difficulties exist when measuring patient expectations such as whether patients value technical skills more highly than interpersonal skills, or vice versa, in medical professionals [27]. Inconsistencies observed in factors related to patient satisfaction in previous reports may be explained by the perceived importance of values by each patient.

In this study, factors found to be relevant to patient satisfaction obtained from previous research were used to predict patient satisfaction. Patient subgroups were created based on the extent to which patients valued technical skills or interpersonal skills of the medical staff, while taking into account the aforementioned factors. Subgroups were then analysed in order to study the relationship between patient perceived priority on medical staff skills and overall patient satisfaction. The objective of this study was to elucidate the differences in factors related to the level of overall patient satisfaction within each subgroup.

Methods

Study design

The study involved a questionnaire survey sent to all discharged patients (2341) from five Japanese public hospitals. Patients discharged into palliative care and those who died during hospitalization were excluded. In terms of size and complexity, the hospitals used in this study varied from 216–676 beds, 3–14 wards and 7–20 clinical disciplines.

Questionnaire design

This study uses a questionnaire that was developed through literature review of related studies and discussions with researchers, hospital managers, doctors, nurses and administrators. This questionnaire consisted of the following domains: overall satisfaction of hospitalizations, satisfaction for doctors, nurses, co-medicals, administrators and living arrangement (meals, room environment and convenience of hospital), patient perceived priority between technical skills and interpersonal skills, and patient factors such as demographics variables or clinical disciplines. Satisfaction items were evaluated by 6–7 Likert scales and evaluated scores ranged between 0 and 100 in each domain. Patient perceived priority was evaluated by a 4-scale semantic differential method (importance of technical skills, slight importance of technical skills, slight importance of interpersonal skills and importance of interpersonal skills).

As clinical disciplines were different among hospitals, we used the following 10 groups for categorization: (1) internal medicine (which included internal medicine, respiratory, gastroenterology, cardiovascular, nervous system, haematology, psychiatrics, endocrine, dialysis, dermatology); (2) surgery (surgery, cardiovascular,

nervous system, gastroenterology, plastic surgery, emergency); (3) rehabilitation (rehabilitation, decubation); (4) obstetrics and gynaecology; (5) paediatrics; (6) otorhinolaryngology; (7) orthopaedic surgery; (8) urology; (9) ophthalmology; and (10) dental and oral surgery.

Questionnaire distribution, collection and ethical policy

Nurses present a questionnaire to patients upon discharge from hospitals. Patients answer the questionnaire anonymously, and they send it completed forms directly to the researchers, not through hospitals. Patients who were unable to complete the forms by themselves were given the option of allowing a proxy to complete the form. For example, children admitted into the paediatrics department or patients in rehabilitation wards could use parents or other family members to assist in filling out the questionnaire.

Patients are also given a description of the purposes and methods of this research when they receive the questionnaires, and submission of the completed questionnaire is regarded as acceptance of participation. This study was approved by the Institutional Review Board of the Kyoto University Graduate School of Medicine.

Statistical methods

Descriptive statistical analysis

In order to investigate whether the respondents in this study were similar to the populations used in previous studies, we analysed the distribution of age, gender and existence of operations by descriptive statistics. We also analysed the relationship between these patients' factors and overall satisfaction, as well as satisfaction segregated by job type (doctors, nurses, co-medical staff and administrative staff) and living arrangements.

Chi-squared automatic interaction detection (CHAID) analysis

Automatic interaction detection (AID) analysis is used as a customer segmentation method in the field of marketing. AID analysis describes the dependent variable-based segmentations by use of a tree diagram. As AID analysis produces only two branches from every node, the resulting tree diagram may end up extremely long and redundant, and thus overly complex. CHAID analysis was developed in order to solve this issue [28–30]. During CHAID analysis, a chi-squared test is conducted when the branches from each node are decided to produce a multiple number of independent branches. As more than two branches may be produced from each node, the resulting tree diagram can be more succinct than if conducted with a standard AID analysis.

The independent variable used in our CHAID analysis was patient perceived priority on the relative importance of doctors' technical skills and interpersonal skills. Dependent variables are gender, age (six categories: under 19, 20–39, 40–59, 60–69, 70–79 and over 80), length of stay (days) in hospital, status of daily activity after discharge and existence of operations. Patient subgroups by CHAID analysis were set with 5% significance probability of decision to branches.

Multiple regression analysis

We regarded the end nodes resulting from CHAID analysis as patient subgroups. We checked the factors of overall satisfaction in every subgroup by multiple regression analysis that used overall satisfaction as the independent variable and satisfaction for doctors, nurses, co-medicals, administrators and living arrangement as the dependent variables.

Descriptive analysis and multiple regression analyses were performed using *SPSS 12.0J* for Windows (SPSS Inc., Chicago, IL, USA). CHAID analysis was performed using *Answer Tree 3.0J*

(**, ***, **).

Results

Descriptive statistics for perceived importance

Out of the 2341 individuals given the questionnaire, a total of 1305 patients responded (response rate of 55.7%). Of the 1305 responding patients, 556 were women (42.6%), with the largest group being those in their seventies (321 patients, 24.6%), followed by those in their sixties (236 patients, 18.1%), and finally those who were older than 80 years (184 patients, 14.1%). Descriptive statistics were used to determine how the relative valuation of the two skills (technical and interpersonal) changed depending on certain factors. The results, according to the patients' perceived importance of either skill, are listed in the Table 1.

Patients' genders, age, whether or not they had an operation, and activity status at the time of discharge were found to be significant factors associated with perceived priority on skill types.

Results of CHAID analysis

Out of the 1305 respondents, 1145 patients completed the questionnaire section on perceived priority. These patients were then segmented using CHAID analysis (Fig. 1). Using a CHAID analysis to create explanatory variables, patients in the first stage of analysis were divided into nodes based on clinical disciplines as follows: node 1 (subgroup 1) consisted of internal medicine, obstetrics, gynaecology and no response; node 2 (subgroup 2) consisted of paediatrics and rehabilitation; node 3 consisted of surgery, orthopaedic surgery, urology, ophthalmology, otology, dentistry and oral surgery. Node 3 was further divided according to whether or not the patient underwent an operation, yielding nodes 4 (those with an operation) and 5 (subgroup 3, those without an operation). Furthermore, node 4 was divided into node 6 (subgroup 4) and node 7 (subgroup 5) according to age. This ultimately resulted in five subgroups.

Subgroup 2, which consisted of paediatric and rehabilitation patients, tended to value both technical and interpersonal skills similarly, while subgroup 1 (internal medicine, obstetrics and gynaecology) showed a higher proportion of patients who prioritized interpersonal skills when compared with other subgroups.

In surgery-related departments, fewer people in subgroup 3 (who did not undergo an operation) valued technical skills when compared with those in subgroups 4 and 5 (who underwent operation during hospitalization). Furthermore, people between the ages of 40 and 79 in subgroup 4 who had an operation tended to prioritize technical skills, as opposed to subgroup 5, in which a greater proportion of both younger and older patients with ages outside the abovementioned age group tended to value interpersonal skills.

Table 1 Distribution of patient factors according to patients' perception of preferred skill type

n (%)	Focused on technical skills	Slightly focused on technical skills	Slightly focused on interpersonal skills	Focused on interpersonal skills	P value
Gender					
Female	195 (40.1)	165 (34.0)	80 (16.5)	46 (9.5)	0.004
Male	277 (49.6)	137 (24.5)	87 (15.6)	58 (10.4)	
Age					
Under 10	18 (17.6)	49 (48.0)	29 (28.4)	6 (5.9)	<0.001
10-19	5 (23.8)	8 (38.1)	7 (33.3)	1 (4.8)	
20-29	21 (33.3)	23 (36.5)	13 (20.6)	6 (9.5)	
30-39	19 (29.2)	26 (40.0)	15 (23.1)	5 (7.7)	
40-49	23 (31.9)	34 (47.2)	9 (12.5)	6 (8.3)	
50-59	85 (57.0)	44 (29.5)	10 (6.7)	10 (6.7)	
60-69	124 (58.5)	42 (19.8)	18 (8.5)	28 (13.2)	
70-79	149 (55.8)	55 (20.6)	33 (12.4)	30 (11.2)	
Over 80	65 (41.4)	34 (21.7)	40 (25.5)	18 (11.5)	
Operation					
With	272 (56.9)	111 (23.2)	57 (11.9)	38 (7.9)	<0.001
Without	247 (37.0)	213 (31.9)	128 (20.6)	79 (11.8)	
Activity status					
Same as before	202 (42.0)	152 (31.6)	81 (16.8)	46 (9.6)	0.006
Little constraint	161 (56.3)	69 (24.1)	31 (10.8)	25 (8.7)	
Stand up over 50% of the time	62 (44.6)	43 (30.9)	22 (15.8)	12 (8.6)	
Lie down over 50% of the time	45 (42.5)	28 (26.4)	18 (17.0)	15 (14.2)	
Always lie down	15 (27.3)	20 (36.4)	13 (23.6)	7 (12.7)	

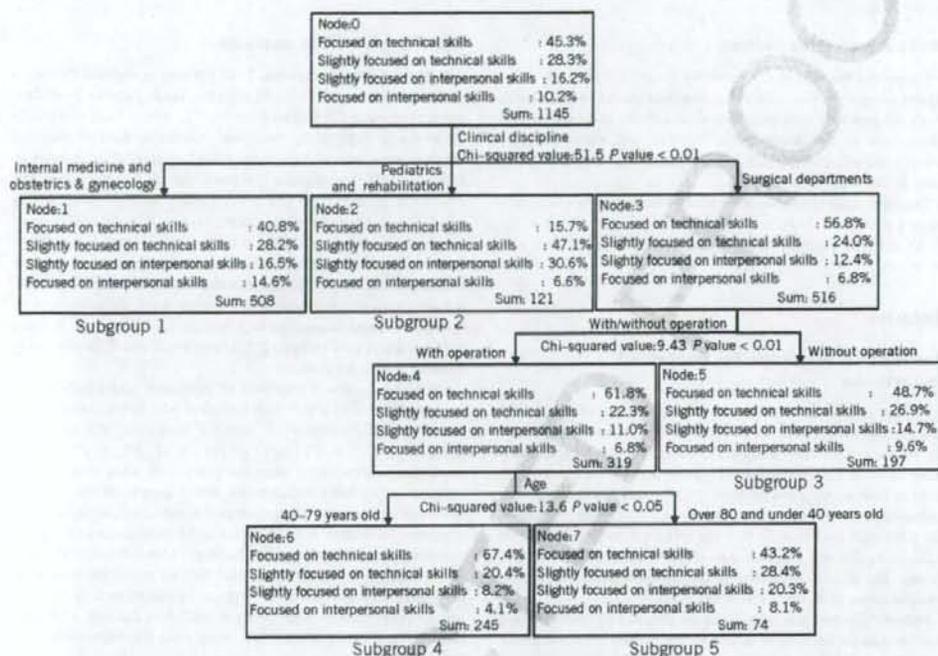


Figure 1 Important skill types as determined by patients.

Descriptive statistics based on patient satisfaction

Table 2 shows overall satisfaction scores of each patient categorized by gender, age, whether or not an operation was performed, activity status at time of discharge and hospitals. The satisfaction scores for each subgroup are displayed in Table 3.

Factors related to satisfaction according to subgroups CHAID analysis

Using overall satisfaction in all patients as the independent variable, multiple linear regression analyses were performed with the following five dependent variables: satisfaction with doctors, nurses, co-medical staff, administrative personnel and in-hospital living arrangements. Adjustments were made according to hospital, gender, length of stay and activity status at time of discharge. Table 4 displays beta, P value and R-squared values from each regression model.

With the independent variable set as overall patient satisfaction, five regression models were conducted adjusting for hospital, gender, length of stay and activity status at time of discharge. The first model included satisfaction with doctors as a dependent

variable, in order to analyse the individual impact of doctors on the R-squared value. The second model analysed the impact of nurses; the third model analysed the impact of co-medical staff; the fourth model analysed the impact of administrative personnel; and the fifth model analysed the impact of living arrangements. The R-squared values, further categorized into patient subgroups, are shown in Table 5.

In order to compare the cumulative contribution of each dependent variable, variables were added to a regression model in stages. Using satisfaction with doctors as the initial variable, subsequent variables were added in the following order: (1) nurses; (2) co-medical staff; (3) administrative personnel; and (4) in-hospital living arrangements. R-squared values were arranged by patient subgroups and displayed in Table 6.

In subgroup 1, doctors and nurses were the factors that contributed the most to patient satisfaction, while in subgroup 2; doctor satisfaction alone exceeded 60%. In subgroup 5, doctors and nurses alone provided more than 60% of patient satisfaction.

To compare variables with in-hospital living arrangements, explanatory variables were added in the following order: (1) administrative personnel; (2) co-medical staff; (3) nurses; and (4) doctors. The R-squared results for this comparison are displayed by subgroup in Table 7.

Table 2 Satisfaction scores according to patient demographic factors and subgroup

	Overall satisfaction	±SD	P value
Gender			
Female	83.1	±16.1	0.632
Male	82.6	±16	
Age			
Under 10	85.4	±13	0.060
10–19	79.6	±12.6	
20–29	83.0	±11.9	
30–39	84.5	±14.2	
40–49	82.6	±15.3	
50–59	79.5	±18.8	
60–69	84.4	±13.7	
70–79	82.5	±17.3	0.019
Over 80	82.5	±17.5	
Operation			
With	81.9	±10.5	0.019
Without	84.1	±15.1	
Activity status			
Same to before	84.7	±14.5	<0.001
Little constraint	83.5	±13.3	
Stand up over 50% of the time	81.4	±16.5	
Lie down over 50% of the time	78.4	±19	
Always lie down	74.2	±24.4	
Hospital			
Hospital 1	81.1	±16.8	0.012
Hospital 2	80.6	±16.7	
Hospital 3	82.4	±18.2	
Hospital 4	84.7	±13.5	
Hospital 5	84.0	±14.9	

Although all subgroups valued hospital living arrangements and administrative personnel, subgroups 1, 2, 3 and 4 valued nurses and doctors, and subgroup 5 valued doctors as the most influential factors contributing to overall patient satisfaction.

Discussion

Group that highly valued interpersonal skills (subgroup 1)

Subgroup 1, comprising of patients in internal medicine, obstetrics and gynaecology departments, placed the greatest value on interpersonal skills among all the patient subgroups. In terms of factors related to satisfaction, the *R*-squared value when using doctors as a factor resulted in a high degree of variability. In previous reports, satisfaction with their doctor influenced patients' medical care as a whole among outpatients [31], while nurses and in-hospital living arrangements had a greater effect on the overall satisfaction of inpatients [20,32]. Thus, it could be that outpatients tended to value technical skills; while inpatients valued interpersonal skills as hospitalization stay naturally results in much more personal contact with the staff. While a high proportion of patients valued interpersonal skills in subgroup 1, the level of satisfaction with their doctor was associated with a high degree of variability in overall satisfaction. This trend has been observed in research per-

formed on Japanese inpatients [20,21] and is likely due to the high value placed on doctor care in this context. However, a comparison of *R*-squared values revealed that when all dependent variables were employed, the *R*-squared value was 0.476, suggesting that satisfaction with doctors (*R*-squared: 0.439) and nurses (*R*-squared: 0.392) are both closely associated with overall patient satisfaction.

Group valuing both technical and interpersonal skills (subgroup 2)

Subgroup 2 comprised of patients in paediatric and rehabilitation departments. More than 80% of subjects were under the age of 10. Multiple regression analysis for overall satisfaction showed that doctors and living arrangements ranked as significant variables, while nurses did not. In this subgroup, 77% of patients valued both interpersonal and technical skills.

Group that highly valued technical skills (subgroup 4)

Subgroup 4 consisted of patients from the ages of 40–79 who underwent an operation in a surgical department. The proportion of those valuing technical skills was highest, and satisfaction with doctors was the most significant factor that contributed to overall satisfaction. Previous studies have reported associations between gender and level of satisfaction [1,7,8]. While in that study, regression analysis did not detect such a relationship, our multiple regression analysis showed that gender was a significant predictor variable in this subgroup (Table 4). One previous study demonstrated that satisfaction was highest among women [1], where 57% of the respondents were aged 40 years or older and closely resembled the age composition of subgroup 4. Moreover, among respondents in the previous study, the proportion of those valuing technical skills was high, a characteristic also observed in subgroup 4. However, we did not address the cultural factors that contribute to the higher degree of satisfaction in women in this study.

In this study, we found age-related differences in patients' perceived priority in patients who underwent an operation. Patients in the 40–79 years of age group had the highest proportion of respondents that valued technical skills. In previous studies, patients who received surgical treatment had a tendency to value technical skills [20]. In addition to confirming previous findings about the relation between whether surgery was performed and perceived priority of skills, we have shown that age is also a factor on patient perceived priority.

When patients were not divided into subgroups, the importance of the two skills varied according to age and gender, as is displayed in Table 1. While previous studies [1–3,5–8] tended to study association of the correlates of overall patient satisfaction with age and gender, it is possible that age and gender are, in fact, confounding factors in the relationship between perceived patient priorities on skill and overall patient satisfaction.

Groups valuing technical skills (subgroups 3 and 5)

Subgroup 3 consisted of patients warded in surgery departments who did not undergo an operation and subgroup 5 consisted of

Table 3 Satisfaction scores according to subgroup

Ave \pm SD	Overall satisfaction	Doctor satisfaction	Nurse satisfaction	Medical staff satisfaction	Admin. satisfaction	Living arrangement satisfaction
P value	0.154	0.610	0.704	0.103	0.953	0.101
Subgroup 1	82.4 \pm 16.7	74.0 \pm 17.9	70.1 \pm 18.1	68.4 \pm 17.0	64.5 \pm 16.6	68.4 \pm 13.8
Subgroup 2	84.3 \pm 14.1	74.4 \pm 19.4	72.8 \pm 20.3	68.3 \pm 19.5	64.6 \pm 19.7	68.5 \pm 16.2
Subgroup 3	81.0 \pm 16.6	75.2 \pm 18.6	70.3 \pm 17.7	71.6 \pm 17.2	65.0 \pm 16.9	70.6 \pm 13.0
Subgroup 4	84.2 \pm 14.2	75.7 \pm 17.2	70.9 \pm 16.5	70.7 \pm 16.0	65.3 \pm 15.9	70.6 \pm 11.7
Subgroup 5	83.7 \pm 16.7	77.0 \pm 18.8	70.6 \pm 18.6	71.7 \pm 19.8	65.7 \pm 16.8	72.3 \pm 14.4

Table 4 Multiple regression analysis using overall satisfaction as an independent variable (standardized coefficient and P value)

	All		Subgroup 1		Subgroup 2		Subgroup 3		Subgroup 4		Subgroup 5	
	β	P	β	P	β	P	β	P	β	P	β	P
N	1145		508		121		197		245		74	
F	0.474 *		0.513		0.568		0.387		0.506		0.481	
Doctor	0.428	0.000	0.388	0.000	0.550	0.001	0.400	0.005	0.631	0.000	0.367	0.072
Nurse	0.255	0.000	0.335	0.000	0.120	0.479	0.315	0.021	0.034	0.760	0.049	0.867
Medical staff	-0.031	0.507	-0.124	0.066	0.239	0.138	-0.004	0.974	0.003	0.976	0.210	0.477
Administrative personnel	-0.002	0.970	-0.015	0.834	-0.258	0.141	0.012	0.926	0.071	0.513	0.118	0.659
Living arrangement	0.113	0.002	0.221	0.000	0.242	0.033	-0.137	0.180	0.042	0.588	0.233	0.256
HP dummy 2	-0.018	0.602	-0.018	0.731	-0.111	0.416	-0.123	0.174	0.051	0.436	0.060	0.699
HP dummy 3	-0.021	0.543	-0.060	0.261	-0.151	0.350	-0.045	0.643	0.102	0.137	-0.152	0.532
HP dummy 4	0.011	0.757	-0.022	0.689	-0.174	0.404	0.025	0.792	-0.021	0.760	0.000	0.999
HP dummy 6	0.026	0.432	0.070	0.153	-0.198	0.256	-0.032	0.712	0.056	0.304	-0.001	0.996
Gender	-0.024	0.420	-0.010	0.829	-0.009	0.928	0.120	0.119	-0.157	0.018	-0.196	0.204
Age	0.030	0.359	0.003	0.954	-0.027	0.898	0.044	0.610	-0.009	0.990	-0.141	0.354
ADL	-0.047	0.141	-0.070	0.135	0.165	0.276	-0.011	0.905	-0.015	0.817	0.050	0.825
LOS	-0.048	0.158	-0.055	0.257	-0.214	0.167	-0.069	0.449	-0.088	0.193	0.040	0.811

HP, **; ADL, **; LOS, length of stay.

Table 5 Adjusted regression analysis coefficients using overall satisfaction as independent variable

	Subgroup 1		Subgroup 2		Subgroup 3		Subgroup 4		Subgroup 5	
	β	R ²								
Doctor	0.631	0.439	0.730	0.607	0.573	0.417	0.723	0.545	0.707	0.544
Nurse	0.590	0.389	0.688	0.522	0.552	0.419	0.497	0.266	0.696	0.505
Medical staff	0.376	0.228	0.565	0.399	0.414	0.292	0.424	0.215	0.669	0.475
Administrative personnel	0.421	0.255	0.500	0.352	0.435	0.313	0.384	0.185	0.525	0.310
Living arrangement	0.482	0.285	0.459	0.343	0.263	0.204	0.401	0.191	0.663	0.451

Table 6 Cumulative contribution of each variable based on changes in R² values when explanatory variables were added in stages during regression analysis, with overall satisfaction as the independent variable **P < 0.01

	Doctors	Nurses	Medical staff	Administrative personnel	Living arrangement	Subgroup 1		Subgroup 2		Subgroup 3		Subgroup 4		Subgroup 5	
						R ²	Δ R ²								
○						0.439	0.373**	0.607	0.453**	0.417	0.275**	0.545	0.502**	0.544	0.369**
○	○					0.504	0.064**	0.616	0.009	0.449	0.031	0.548	0.004	0.605	0.060
○	○	○				0.506	0.002	0.622	0.006	0.449	0.000	0.550	0.001	0.639	0.034
○	○	○	○			0.506	0.000	0.625	0.003	0.449	0.000	0.552	0.002	0.644	0.005
○	○	○	○	○		0.537	0.031**	0.659	0.034	0.459	0.010	0.553	0.001	0.663	0.019

Table 7 Cumulative contribution of each variable based on changes in R^2 values using explanatory variables added in stages during regression analysis, with overall satisfaction as the independent variable (2: reverse order of variables entry). ** $P < 0.01$, # $P < 0.10$

	Doctors	Nurses	Medical staff	Administrative personnel	Living arrangement	Subgroup 1		Subgroup 2		Subgroup 3		Subgroup 4		Subgroup 5	
						R^2	ΔR^2								
						0.295	0.219**	0.343	0.189**	0.204	0.061**	0.191	0.148**	0.451	0.276**
				○		0.350	0.065**	0.432	0.090**	0.306	0.103**	0.318	0.126**	0.572	0.121**
			○	○		0.352	0.001	0.515	0.082	0.325	0.019	0.351	0.033	0.599	0.026
		○	○	○		0.470	0.119**	0.589	0.055**	0.414	0.089**	0.403	0.052**	0.613	0.015
	○	○	○	○	○	0.537	0.067**	0.659	0.088**	0.450	0.045**	0.553	0.150**	0.663	0.050#

patients warded in surgery departments who underwent an operation and were under 40 and over 80 years of age. In both these subgroups, patients tended to value technical skills. Multiple regression analysis of subgroup 3 suggests that overall satisfaction was most closely associated with doctors, even among those who did not have an operation. Subgroups that were created by combining several variables with the two skills showed that the satisfaction level of subgroup 3 (patients without operation) was lower than that of subgroups 4 and 5 (patient with operation). A comparison between subgroup 3 and subgroup 5 demonstrated that the proportion of those who valued interpersonal skills was relatively high among patients under the age of 40 and over 80 for those who had an operation, compared with those who did not have an operation. This demonstrates the need to examine age and whether an operation was performed or not when analysing overall patient satisfaction. Additionally, Table 7 shows that subgroup 5 had an increased R -squared value with living arrangements; however, satisfaction with nurses did not significantly increase R -squared. Thus, it appears that living arrangements are highly influential towards overall patient satisfaction.

When we compared subgroup 5 and subgroup 3, different ages in subgroup 4, we found that older patients tended to value interpersonal skills, even when they had an operation. In previous reports, comparisons were made solely based on whether an operation was performed or only by age (divided between younger and older patients) alone, so no results have been reported based on both variables, as we have done in this study. In previous research regarding patients who had an operation, there was a tendency to value technical skills [33]. However, in the present study, many of the respondents who had an operation were under the age of 54, whereas many of those who did not have an operation were over the age of 55. In other words, it is possible that people over the age of 40 and under 80 who valued technical skills in the present study are similar to the respondents who valued technical skills in previous studies.

Previous reports have also shown that patients who valued interpersonal skills tended to be young, female without operation, displayed poor activity status at the time of discharge, had a short stay in hospital and with no distinction between the departments in which they were treated [34]. The present study showed that patients who valued interpersonal skills were from internal medicine, obstetrics, and gynaecology departments (subgroup 1) and patients under the age of 40 and over 80 who had an operation (subgroup 5). Moreover, the proportion of patients in subgroup 3 who did not undergo operation tended to value both skills when compared with those of patients who underwent an operation. A

previous study [1,14–17] showed that patients who did not require surgical treatment valued interpersonal skills more than technical skills, and patients who did not undergo surgeries in this study also tended to highly value interpersonal skills (though not higher than technical skills).

Issues in methodologies aimed at grouping patients

By using CHAID analysis rather than cluster analysis undertaken according to the Ward method, the branching factors are clear, and the attainability of the subgroup is assured [35]. In this study, the manner by which each subgroup was selected (by medical department) was clear, which made it possible to compare patient factors identified in previous studies. In marketing theory, there are four levels of market segmentation: segment, niche, local and individual [36,37]. The present findings are useful insofar as they show general tendencies within individual departments under hospital management, but not for determining treatment for the individual patient. Furthermore, because CHAID analysis was used in this study, we were able to show an interaction among variables. In previous studies, levels of patient satisfaction were analysed by individual variables identified by researchers, and little research has analysed the interactions among these variables. For example, we know from previous reports that interpersonal skills are valued for certain groups of patients requiring no operation [33], but in this study, technical skills were found to be valued as well. In other words, because patients were compared solely on the basis of whether or not an operation was performed, the results included patients in various departments. In this study, subgroups were created by considering only patients in surgery departments, and a difference in perceived importance of skills was observed according to whether or not they had an operation. As such, this study makes a unique contribution to the literature, and shows that even inpatients who did not have an operation, the proportion of those warded in surgery departments who value technical skills is high.

Based on the present findings, it is unclear exactly what sort of treatment the patients received while in the hospital. It would certainly be possible to create subgroups based on the detailed importance of the two skills and various patient factors, including names of diseases and types of treatment. However, wherever possible, we have addressed confounding variables such as clinical disciplines and whether or not an operation was performed. Our results are based on one dataset, and in the future, we hope to address the applicability of the methods used to group patients. Although we found that the stability of variables establishing

patient groupings was low, it is difficult to claim that these are general patient subgroups. Our results help to clarify the association between patient satisfaction and factors related to the importance of types of care from a patient's perspective.

Conclusions

We demonstrate that different patient subgroups prioritize certain types of care skills over others. This was achieved by analysing demographic variables as well as clinical discipline information, both of which were readily available. Factors contributing to overall patient satisfaction were found to be different depending on the subgroup. We were also able to explain some inconsistencies between previous studies in terms of differences in patient demographic variables and factors associated with patient satisfaction. We conclude that differences in correlates of patient satisfaction could be explained by different perspectives on prioritized skills.

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Genki Murakami *et al.*

Patient perceived priorities

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Work stress and workload on full-time anesthesiologists of acute care hospitals in Japan

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Short title: Stress of anesthesiologists in Japan

Key words: Anesthesiologist, Workload, Stress, Factors causing stress

Abstract

Purpose: The number of anesthesiologists per the population in Japan is small compared with Europe and North America. While there is a growing concern that hard work causes anesthesiologists' fatigue and may compromise patient safety, workload, physical stress of anesthesiologists, as well as the impact of staff support on physicians' stress have not been assessed in detail. The goal of the study was to evaluate the working environment, anesthesia workload, and occupational stress of anesthesiologists in Japan.

Methods: A questionnaire survey was performed targeting 1,010 members of the Japanese Society of Anesthesiologists working as anesthesiologists affiliated with acute care hospitals in Japan. Data on background information, working environment, operation anesthesia duties, and stress were collected and the relationship of work stress with background, environment and anesthesia duties was evaluated by linear regression analysis.

Results: Responses were obtained from 383 full-time anesthesiologists (the response rate was 43.6%). The total anesthesia time per week was 23.6 hours on average. The work stress score was 114.3 ± 30.2 (mean \pm SD) when the average workers in Japan was 100. Work stress score was significantly associated with "Years of experience" (with experience < 10 years considered as the reference; 10-19 years: $\beta = -0.18$, $p = 0.02$, ≥ 20 years: $\beta = -0.15$, $p = 0.04$), "Hospital with ≥ 500 beds" (with a hospital with ≤ 299 beds considered as the reference; $\beta = 0.15$, $p = 0.04$), "Total time of anesthesia per week" ($\beta = 0.18$, $p = 0.02$), "Estimated annual cases managed by an anesthesiologist" ($\beta = 0.12$, $p = 0.04$) and "No-support stress" ($\beta = 0.21$, $p < 0.01$) in linear regression analysis ($R^2 = 0.12$).

Conclusion: Our results provide a quantitative assessment of the duties of anesthesiologists and show that work stress among anesthesiologists is related to workload and other factors.