

國科會研究成果報告

NSC90-2415-H002-025

醫療市場資訊的初步探討：醫院口碑的可信度分析

台大公衛學院 鄭守夏

Determinants of patient satisfaction and recommendation of a hospital: effects of interpersonal  
and technical aspects of hospital care

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**Objectives.** To examine the determinants of patient satisfaction with and recommendation of a hospital with a special focus on the interpersonal and technical performance of hospitals.

**Design.** Survey of patients with 4 specific conditions after their discharge from hospitals.

**Setting.** Accredited district teaching hospitals nationwide in Taiwan.

**Participants.** A total of 4,945 patients from 126 hospitals diagnosed with or undergoing procedures related to stroke, diabetes mellitus, cesarean section or appendectomy were interviewed by telephone.

**Main outcome measures.** Overall patient satisfaction and recommendation were measured by single-item questions. Interpersonal skills were measured by three items— doctors' explanation, attitude, and caring. Technical skills were measured by another three items- hospital equipment, clinical competence, and outcome of treatment.

**Results.** Patient satisfaction and recommendation did not always agree with each other, 20.8% of the not-satisfied patients still recommended the hospital. Patient ratings of interpersonal and technical performances were two major predictors of their satisfaction and recommendation.

For all four of the conditions, technical aspect was more important than interpersonal skills in determining patient recommendation of a hospital according to the standardized regression coefficients. On the other hand, the magnitudes of effects of the interpersonal and technical skills on patient satisfaction were not consistent among the four conditions.

**Conclusion.** The preliminary results imply that a hospital with high percentage of patient satisfaction does not necessarily receive a high level of recommendation. This finding provides new insights for researchers and for hospital managers who devote resources exclusively for achieving highest possible levels of patient satisfaction.

**Keywords:** Patient Satisfaction, Recommendation, Hospital, Quality of Care, Taiwan

## Determinants of patient satisfaction and recommendation of a hospital: effects of interpersonal and technical aspects of hospital care

### **Introduction**

Patient satisfaction has been an important issue for health care managers to address because it is one of the essential components concerning outcome measurements. Many previous studies have developed and applied patient satisfaction as a quality improvement tool for health care providers [1-3]. Following increased levels of competition and the emphasis of consumerism, patient satisfaction has become an important measurement for monitoring health care performance of health plans [4,5]. This measurement has developed along with a new feature – the patient's perspective of quality of care [6-9].

Various dimensions of patient satisfaction have been identified, ranging from admission to discharge services, as well as from medical care to interpersonal communication.

Well-recognized criteria include responsiveness, communication, attitude, clinical skill, comforting skill, amenities, food services, etc [10-13]. It has also been reported that the interpersonal and technical skills of health care provider are two unique dimensions involved in patient assessment of hospital care [14,15].

Determinants of patient satisfaction have been reported extensively. According to previous studies, patient characteristics such as age and education may influence a patient's assessment of hospital performance [9,16,17]. A patient's health status and the severity of illness are also important predictors of the patient's overall satisfaction level [8,12,16,18-20]. Hospital features such as hospital size have been reported to be associated with consumer assessment of hospital quality [1,9,11,12,21]. The relationship between health care providers and patients (i.e. interpersonal skill) has been reported to be the most influential factor for patient satisfaction [9,18,22], however the findings were not totally conclusive [7].

A lack of available information for consumers to choose a preferred health care provider is commonplace in many countries. We also know that personal channels of communication with relatives and friends are a major source of information for people wishing to obtain details concerning hospital performance [23,24]. Therefore, recommendations from significant others become an important source of information for selecting health care providers.

Recommendation as well as satisfaction is based on personal experience concerning the services that one has received from health providers. A number of previous reports included recommendation and satisfaction items to form an overall assessment of patient satisfaction, but no differentiation between these two measures was discussed [15,25,26]. Recent studies suggest that patient recommendation of a hospital should be analyzed separately (see below).

Burroughs and colleagues [3] reported that, of the different settings of health care services (i.e. inpatient care, outpatient surgery, outpatient test/treatment and emergency care), compassionate patient care, including personal attention, respect, comfort and the like, were the most important factors influencing a patient's intention to recommend a provider or for that patient to return to the same provider in the future. Their findings are in agreement with previous reports indicating that patient satisfaction is determined mainly by a provider's attitude and caring rather than technical skills [9,18]. Nevertheless, they also found that physician care delivery (such as skill, frequency of checking, and explanation) was not associated with patient recommendation or return, which is not a persuasive finding.

Recently, Boudreaux and colleagues [27] analyzed a small sample of 437 emergency department patients and reported that overall patient satisfaction and the likelihood of recommendation were influenced by somewhat different factors. They found that respect, safety and understandable instructions were common factors associated with satisfaction and recommendation. On the other hand, the technical skills of nurses and waiting time were associated with recommendation only, and patient's age and insurance status were associated with satisfaction only. These findings may not be generalized to other patients due to its specific setting and small number of participants.

To investigate the factors associated with patient recommendation and satisfaction respectively, the present study employed a larger number of inpatients (nearly five thousand) with specific diagnoses or conditions in order to control possible confounding effects due to variation of disease combinations. Factors associated with hospital care were intentionally stratified into two important dimensions - interpersonal skills and clinical competence - to facilitate easier understanding and interpretation. Data were collected in Taiwan where the hospital care market is highly competitive and patients can choose any hospital to receive care under a universal health insurance scheme. With a high degree of freedom for patients to choose among hospitals, personal channels of recommendation are very influential and thus provide an excellent opportunity to examine any potential differences between patient satisfaction and recommendation of a hospital.

#### *Health care services in Taiwan*

The health care service market in Taiwan is highly competitive. After implementation of the National Health Insurance (NHI) program in 1995, the situation of competition became more intense. Small-scale hospitals were driven out of the market. The number of hospitals decreased from 828 in 1994 to 669 in 2000; however, the number of hospital beds nationwide

increased 21.9% from 103,733 to 126,476 during the same period [28]. Approximately 96% of all citizens in Taiwan (about 23 million) are covered under the NHI, and more than 95% of the hospitals nationwide are NHI-contracted providers. Without a formal referral requirement, people are free to choose any contracted hospitals they like to receive health care services.

Since the Bureau of the National Health Insurance (BNHI) is the only buyer (or insurer) of health care services, it sets payment schemes for all contracted providers for various kinds of services. Therefore, health care providers have to compete for patients under a mostly fee-for-service reimbursement system with nearly fixed payment schemes. Detailed descriptions of the implementation and influence of the nationwide health insurance program are available elsewhere [29-31].

The quality of health care varies significantly among hospitals in Taiwan. Almost all of the hospitals are closed systems in that hospitals hire physicians to provide outpatient and inpatient care within the hospitals. While a medical-specialist training program was established in 1988, approximately 30% of practicing physicians, however, have not as yet undergone any form of specialist training [32]. The hospital accreditation system, which was started in 1978 by Taiwan's Ministry of Education and Department of Health (DOH), issues levels of the accreditation on the basis of a hospital's capabilities and quality of performance as determined by an expert team's on-site inspection. There are 4 levels to this accreditation system which, in

descending order, are medical center hospital, regional hospital, district teaching hospital, and district hospital [33].

Generally speaking, the level of accreditation is positively correlated with the bed-size (which also represents amount of equipment) of a hospital. Among the 669 hospitals nationwide in 2000, there were 20 medical centers and 63 regional hospitals, with most of these hospitals being large-scale with 500 to 2,000 beds and possessing advanced clinical diagnostic and therapeutic equipment. In spite of the accreditation system, in 2000 there were 163 of the 669 hospitals without accreditation, with most of these being small-sized hospitals with less than 50 beds [34]. A hospital's reputation (i.e. people's recommendation) or its bed size was nearly the only information available to prospective patients or their family members in order to select a preferred hospital.

## **Methods**

### *Sources of subjects*

Since the diagnostic and treatment procedures might vary significantly among different diseases, we decided to select patients with certain diagnoses/procedures for the study. After

consulting medical professionals and considering the prevalence of the diagnoses for case collection, we chose 2 chronic diagnoses – stroke and diabetes mellitus (DM), and 2 acute procedures - cesarean section (C/S) and appendectomy as our study conditions. To avoid too few cases from individual small-scale hospitals, we only included patients discharged from those with accredited district teaching hospital or above. The aim within this project was to gather 5,000 patients for analysis with no less than 1,000 cases for each condition.

Sample selection was conducted with the help of the Bureau of the NHI. All of the NHI-contracted hospitals file claims to one of the six regional NHI branches monthly. The branch offices selected discharged patients claim data for routine posterior utilization review every month. The method of selecting subjects for routine review is random-based with a predetermined proportion; however, it may vary among the six regional branches. Accordingly, during the study period, they identified candidate subjects with the above-mentioned diagnoses or procedures and then sent the list of patients to our research team as the basis of a potential target population. We performed a systemic random sampling using appropriate proportions for each of the four conditions to obtain the required number of cases for the survey. The study period of the project extended from June 1999 to March 2000.

*Measurement of patient perception of hospital care*

A structured questionnaire was designed to examine several aspects of hospital care including out-of-pocket payment, medical and nursing care, and post acute care utilization, etc. The questionnaire was standardized via a small-scaled pilot test on 80 discharged patients. A mass telephone survey was carried out by employees from the six branches of the BNHI. Discharged patients or their primary family caregivers were asked questions concerning their experience during that specific hospitalization period. Patients were contacted and interviewed approximately 3 months after their discharge.

Two dependent variables were used in this study to indicate the patients' perception of overall hospital quality: satisfaction and recommendation. The question measuring patient satisfaction was stated as "Generally speaking, were you satisfied with the inpatient care?" Response categories were "satisfied", "fair", or "not satisfied". When analyzing this variable, we dichotomized the responses by treating "satisfied" as one group and the remaining two responses as the other in a logistic regression model. The question for patient recommendation was "If someone asks you about that hospital, would you recommend it?" Response categories were "strongly recommend", "recommend", "conservatively recommend", "not recommend", and "definitely not recommend". In a logistic regression model, the first two responses

(strongly recommend and recommend) were defined as one group and the remaining 3 responses as the other.

Multiple dimensions of hospital quality of care have been identified in previous studies. [11-13]

However, due to the constraints of a multiple-purpose questionnaire administered by telephone survey, only a limited number of questions can be employed for measuring the quality of care.

After reviewing several measurement tools developed by previous researchers and considering patients' ability to answer the questions, we selected 6 items to measure two major dimensions of quality of care: the clinical competence of hospital and the inter-personal skills of physician.

Clinical competence included three items - hospital equipment, physician competence, and treatment outcome or recovery. Inter-personal skills also included three items - doctor's attitude, doctor's caring manner, and doctor's explanation of illness or condition.

Five-level response categories were designed respectively for each of the six questions such as "definitely enough" to "obviously insufficient", "very good" to "very poor", or "much better than expected" to "worse than expected." Scores ranging from 5 to 1 were assigned to the five categories of answers, the three items for each dimension summed to form the clinical competence and inter-personal skills scores, respectively, which ranged from 15 down to 3.

Higher scores were representative of better-perceived quality of hospital performance. Missing

values in each of the six items (from 0.4 % to 13.3 % of the total number of people surveyed in each category) were replaced by the mean scores for each of the four diagnoses in order to maximize the amount of useful information. Patients with different conditions were analyzed separately as suggested by Hargraves et al. [16] to account for possible clinical variations.

## **Results**

A total of 4,945 patients or primary caregivers were interviewed successfully with a response rate of 67.0%. Basic information concerning the sample population is shown in Table 1. Due to the differences of disease prevalence and the differences in the six BNHI branches' sampling mechanism, case numbers for the four conditions varied largely. Cesarean section (C/S) was the major procedure performed with 1,704 patients in this category, while appendectomy was the least performed procedure with 787 patients. There were fewer females with appendectomy and stroke (45.2% and 42.8%, respectively). Age distribution was significantly different between patients with chronic or acute diagnoses. The mean age was around 31 years for patients with C/S or appendectomy, while the figures were approximately 64 and 68 for DM and stroke patients, respectively.

There were also differences in levels of patient education. The majority of patients with C/S

were high school or college graduates. The educational level of patients with appendectomy was more evenly distributed with 34.6% of them being high school graduates. In contrast, the majority (about 76%-78%) of patients with chronic diagnoses were illiterate or received less than 6 years of schooling. The difference in education was due to the cohort effect along with the economic development in Taiwan after the World War II. The essential differences in age and education between chronic and acute patients suggested that further analyses should take these variations into consideration.

Patients were discharged from 126 hospitals. According to the hospital accreditation levels, approximately 47.3% of all patients were discharged from regional hospitals, 35.6% from district teaching hospitals, and 17.1% from medical centers. The proportion of patients discharged from regional hospitals was higher than that of the national average (47.3% vs. 33.7%), while the proportions of the two other levels showed the opposite situation. Patient distribution among the three levels of hospitals also varied slightly for the four diagnoses.

Results of patient perceptions of hospital quality are listed in Table 2. Satisfaction measurement showed that 64.2% of patients were satisfied with the hospital care they received, with C/S patients having the highest percentage (74.1%) of satisfaction. The overall proportion of hospital recommendation (strongly recommend, and recommend) was 71.5%, with C/S

patients having the highest rate of recommendation (81.1%) and patients with stroke or DM the lowest rates (65.5% - 65.9%). We also noted that there were more missing values to the recommendation question than to the satisfaction question. The overall proportion of “no answers” for the recommendation question was 16.4% while only 1.6% responded with “no answer” for the satisfaction question. We tested the association between the “no answer” response to the recommendation question and patient-characteristics such as age, sex, and education according to the four diagnoses and found no significant differences.

The mean scores of the summary and individual items for hospital quality measurement are also presented in Table 2 according to the four diagnoses. Generally speaking, the scores for physician’s inter-personal skills (12.54 in total) were higher than that for the hospital technical skills (11.84 in total). For the six individual items, physicians’ explanations of conditions had the highest scores, which ranged from 4.17 to 4.47 with an average of 4.28. The perceived recovery had the lowest scores, which ranged from 3.78 to 3.95 with an average of 3.85.

Variations between groups of patients with different diagnoses were seen in the scoring of perceived performance. Scores for the six items as well as the two summary skills were constantly higher in the C/S group and lower in the DM and stroke groups.

The association between recommendation/satisfaction and the two scores are presented in

Table 3. Patient satisfaction was classified into three categories: satisfied, fair, and not satisfied.

Patients who did not answer the question (1.6%) were excluded from the analysis.

Recommendation of a hospital was categorized in a different way. Since 16.4% of the respondents did not answer the question, we specified this group as a unique category. These subjects might represent the opinion between “recommend” and “not recommend”. Therefore, the three groups of the recommendation question were: strongly recommend and recommend (71.4%), no answer (16.4%), and conservatively recommend or not recommend (12.2%).

Constant associations were observed between satisfaction/recommendation and the two sets of interpersonal and technical scores. Patients who were satisfied reported higher values for interpersonal and technical scores (13.0 and 12.3), while the lowest score (10.1 and 9.3) were associated with dissatisfied patients. The trend was consistent for each of the four conditions, with all of the associations having a statistical significance of  $P < 0.05$  level with ANOVA.

Recommending a hospital or not showed similar results in relation to interpersonal and technical scores. Patients who would recommend a hospital had the highest scores (12.9 and 12.3, respectively), while patients who would not recommend a hospital had the lowest scores (11.1 and 9.9). Patients who gave no answer to the recommendation questions had in between scores (12.1 and 11.2). All differences were significant at  $P < 0.05$  level (ANOVA).

The mean scores of interpersonal and technical skills were slightly different in the three categories of satisfaction and recommendation. Therefore, we constructed a 3 by 3 cross-table to examine the degree of concordance between satisfaction and recommendation. We found that, by combining the four conditions, 52.4% of the patients were in the satisfied-recommend cell, 6.3% of the patients were in the fair-no answer cell, and only 0.8% of the respondents were in the dissatisfied-not recommend cell. Approximately 40% of the patients were in the off-diagonal cells, indicating that some satisfied patients would not recommend a hospital or vice versa. For example, 20.8% of the “not satisfied” patients still recommended the hospital. This suggests that the measures of satisfaction and recommendation might have different meanings to the consumer.

We subsequently constructed logistic regression models for the four diagnoses respectively to investigate the effects of patients’ perceived hospital quality on their satisfaction and recommendation. Results of the regression models for the two acute conditions, C/S and appendectomy, are presented in Table 4. In order to compare the magnitude of the effects of various independent variables, we presented the standardized regression coefficients from the models. Inter-personal skills and technical skills were the two major influential factors for both patient satisfaction and recommendation. In the C/S group, technical skills appeared to be more influential than inter-personal skills for either satisfaction or recommendation, with

standardized coefficients of 0.35 vs. 0.23 and 0.46 vs. 0.29, respectively. However, in the appendectomy group, inter-personal skills and technical skills had similar magnitude of effects on patient satisfaction (0.28 vs. 0.29); while technical skills accounted for a heavier weighting (0.69 vs. 0.32) on patient recommendation of a hospital. We also noted that higher-level accredited hospitals (medical centers or regional hospitals) tended to be recommended more often than district teaching hospitals, and that higher education levels in the C/S group were negatively associated with the recommendation of hospitals.

Table 5 shows the results of logistic regression models for the two chronic diagnoses. Similar to the findings for the acute patients, inter-personal and technical skills were the two major determinants for patient satisfaction and recommendation. In the DM group, interpersonal and technical skills had similar magnitudes of effect on patient satisfaction, with standardized regression coefficients of 0.31 and 0.28, respectively. However, technical skills had a greater effect on patient recommendation with coefficients of 0.76 and 0.30, respectively. Findings in the stroke group were slightly different. For patient satisfaction, inter-personal skill was more influential (0.40 vs. 0.20); however, for patient recommendation, technical skills were apparently more important (0.70 vs. 0.39). We also found that DM patients were more satisfied with higher-level accredited hospitals and were more likely to recommend medical centers. Compared with the illiterate, any level of education was negatively associated with satisfaction

and recommendation in the DM group. No personal characteristics were found to be associated with satisfaction or recommendation among the stroke patients.

## **Discussion**

Patient satisfaction and recommendation are highly correlated measures for perceived quality of care. However, we found that a certain proportion (20.8%) of the “not satisfied” patients still recommended the hospital. This means that a hospital with high percentage of patient satisfaction does not necessarily receive a similar level of recommendation. Besides, patient perceptions concerning hospitals’ technical competence and physicians’ interpersonal skills seemed to be good predictors for patient satisfaction and patient recommendation of a hospital. Yet, perceived technical competence and interpersonal skills had different magnitudes of effect on patient satisfaction and recommendation. Noticeably we found that technical aspect of care is more important than interpersonal skills in determining patient recommendation of a hospital.

According to previous reports, patient satisfaction mainly reflected a hospital’s service quality rather than clinical quality [3,9,18]. Our findings largely support their conclusions.

Interpersonal skills were as influential or more influential than clinical competence on patient

satisfaction for all of the study groups examined except for C/S. On the contrary, technical competence was a more influential predictor for recommendation of a hospital for all four of the study groups (Table 4 and Table 5).

The personal characteristics of patient have been reported to be associated with patient satisfaction [1,9,27]. while some studies have reached different conclusions [21]. When analyzing the data here for the four diagnoses combined, we found that patient age, gender and education were significantly associated with their satisfaction response. After controlling for the four conditions in separate models, however, personal characteristics had only a slight influence on satisfaction with, or recommendation of, a hospital. Our findings also suggest that the influence of case mix or personal characteristics on patient satisfaction tended to be less conclusive.

Limitations of the study should also be noted. Compared with well-developed measurement tools such as PJHQ (Patient Judgment of Hospital Quality) with a total of 106 items [10], the six items used in our study may be too limited. The 3 items measuring the inter-personal skills of physicians might be more acceptable for some researchers than the 3 items for technical competence. One may argue that patients do not have the ability to judge the excellence of a hospital's equipment or a doctor's competence; however, patient perception is an influential

factor for their selection of hospitals. This is the key point of our study - to show the effects of perception on patient satisfaction and recommendation of a hospital. We agree that there is room for improvement and that more items may be needed; however this might be a good starting point to investigate patient perception of the clinical performance of hospitals and their recommendation of a hospital.

Reputation, as represented by a consumer's recommendation, is an important source of information for patients or families when choosing a hospital. Our preliminary results indicate that, in Taiwan, a hospital's reputation is determined mainly by its clinical competence rather than interpersonal skills. A hospital with good reputation, i.e. being highly recommended, does not necessarily have a similar level of patient satisfaction. Our findings might reveal new insights for researchers dealing with quality of health care and for hospital managers who devote resources exclusively to achieving highest possible levels of patient satisfaction.

## **Acknowledgements**

This study was supported by grants from the National Science Council (NSC88-2621-B-002-027, NSC89-2320-B-002-095) and the National Health Research Institutes (NHRI-EX90-8801PP) in Taiwan. The authors appreciate the co-operation of the Bureau of National Health Insurance and its six branches. We also wish to thank Mr. I-Chan Huang, Miss Chin-Yu Lin, and Miss Shu-Hui Chen for their professional assistance.

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Table 1: Basic information of discharged patients according to the 4 conditions

Items	C/S	Appen.	DM	Stroke	Total
N	1,704	787	1,163	1,291	4,945
Gender (%female)	100	45.2	54.4	42.8	65.6
Age ( $\bar{X} \pm SD$ )	30.5 $\pm$ 14.3	31.1 $\pm$ 13.0	63.7 $\pm$ 4.9	68.0 $\pm$ 16.5	48.2 $\pm$ 21.4
Age Group 1 (%)					
≤14	-	14.8	0.6	0.2	2.6
15-24	11.6	25.7	1.1	1.2	8.4
25-34	67.7	22.9	1.6	0.7	27.6
35-44	20.6	16.7	5.6	3.3	12.0
45-54	0.2	11.3	13.9	11.6	8.2
55-64	-	4.2	23.4	18.6	11.0
65-74	-	2.9	30.2	31.8	15.8
≥75	-	1.4	23.2	33.7	14.5
Education (%)					
Illiteracy	0.5	7.5	40.1	41.7	21.7
1-6 years (primary)	3.0	17.9	36.5	36.6	22.0
7-9 years (junior high)	9.7	20.8	9.9	7.4	10.9
10-12 years (high)	49.2	34.6	9.5	9.2	27.1
≥13 years (college)	37.5	18.8	3.7	4.7	18.0
Hospital Accreditation (%)					
Medical Center	15.7	16.8	17.3	19.1	17.1
Regional Hospital	44.0	48.5	49.2	49.1	47.3
District Teaching H.	40.3	34.7	33.5	31.8	35.6

Table2: Patient satisfaction, recommendation and scorings (mean  $\pm$  S.D.) of hospital quality

Items	C/S	Appen.	DM	Stroke	Total
Satisfaction with Care (%)					
Satisfied	74.1	63.3	58.1	57.4	64.2
Fair	23.2	31.8	34.9	36.2	30.7
Not Satisfied	2.1	3.7	5.1	3.9	3.5
No Answer	0.7	1.3	1.9	2.6	1.6
Recommend the Hospital (%)					
Strongly Recommend	11.7	8.3	6.8	8.3	9.1
Recommend	69.4	60.6	59.1	57.2	62.4
Conservatively Recommend	5.6	5.8	7.5	7.5	6.6
Not Recommend	3.4	5.8	4.6	3.9	4.2
Definitely Not Recommend	0.6	1.9	1.7	1.7	1.4
No Answer	9.3	17.5	20.3	21.5	16.4
Inter-personal Skills *					
Doctor's Attitude	12.9 $\pm$ 1.8	12.4 $\pm$ 1.9	12.3 $\pm$ 1.9	12.3 $\pm$ 1.9	12.5 $\pm$ 1.9
Explanation of Condition	4.2 $\pm$ 1.0	4.2 $\pm$ 1.0	4.0 $\pm$ 0.9	4.1 $\pm$ 1.0	4.1 $\pm$ 1.0
Doctor's Level of Care	4.5 $\pm$ 0.6	4.2 $\pm$ 0.7	4.2 $\pm$ 0.7	4.2 $\pm$ 0.7	4.3 $\pm$ 0.7
	4.2 $\pm$ 0.7	4.1 $\pm$ 0.7	4.1 $\pm$ 0.7	4.1 $\pm$ 0.7	4.1 $\pm$ 0.7
Technical Skills *					
Doctor's Competence	12.3 $\pm$ 1.6	11.8 $\pm$ 1.8	11.4 $\pm$ 1.8	11.5 $\pm$ 1.9	11.8 $\pm$ 1.8
Hospital's Equipment	4.2 $\pm$ 0.6	4.0 $\pm$ 0.8	3.9 $\pm$ 0.8	3.9 $\pm$ 0.7	4.0 $\pm$ 0.7
Recovery	4.1 $\pm$ 0.9	3.9 $\pm$ 1.0	3.7 $\pm$ 0.9	3.7 $\pm$ 0.9	3.9 $\pm$ 1.0
	4.0 $\pm$ 0.7	3.9 $\pm$ 0.8	3.8 $\pm$ 0.7	3.8 $\pm$ 0.8	3.9 $\pm$ 0.7

\* Individual items ranged from 1 to 5, summarized items ( i.e. inter-personal skills and technical skills ) ranged from 3 to 15 with higher scores representing better performance

Table3: Means (and S.D.) of interpersonal (Inter.) and technical (Tech.) scores by levels of patient satisfaction and recommendation.\*

	C/S		Appendectomy		DM		Stroke		Total	
	Inter.	Tech.								
Satisfaction										
Satisfied	13.22 (1.58)	12.65 (1.44)	12.92 (1.76)	12.24 (1.57)	12.88 (1.49)	11.88 (1.51)	12.93 (1.44)	11.99 (1.60)	13.04 (1.57)	12.28 (1.55)
Fair	12.20 (2.09)	11.47 (1.60)	11.84 (1.91)	11.20 (1.76)	11.88 (1.80)	11.03 (1.71)	11.82 (1.76)	10.99 (1.86)	11.94 (1.90)	11.17 (1.74)
Not Satisfied	10.93 (2.87)	10.74 (2.40)	10.37 (2.24)	9.63 (2.79)	9.44 (2.64)	8.12 (2.35)	9.94 (3.03)	9.29 (2.70)	10.10 (2.78)	9.34 (2.69)
Recommendation										
Recommend	13.12 (1.68)	12.56 (1.47)	12.85 (1.71)	12.25 (1.46)	12.75 (1.57)	11.97 (1.40)	12.87 (1.47)	12.07 (1.50)	12.94 (1.62)	12.27 (1.48)
Not Recommend	11.54 (2.45)	10.78 (1.91)	11.08 (2.26)	9.99 (2.06)	11.10 (2.26)	9.44 (2.13)	10.82 (2.28)	9.45 (2.13)	11.13 (2.33)	9.92 (2.13)
No answer	12.65 (1.60)	11.88 (1.45)	12.09 (1.96)	11.44 (1.85)	11.98 (1.81)	10.86 (1.61)	11.75 (1.69)	10.80 (1.66)	12.07 (1.78)	11.16 (1.68)

\* Differences of means for interpersonal and technical scores among the 3 levels of satisfaction, as well as recommendation, statistical significance at  $p < 0.05$  levels (using ANOVA)

Table4: Determinants of patient satisfaction and recommendation of hospitals from logistic regression models of subjects with acute diseases+ ( standardized  $\hat{\alpha}$  coefficients, P values in parentheses )

Variables	C/S		Appendectomy	
	Satisfaction	Recommendation	Satisfaction	Recommendation
Inter-personal Skills	0.23 (0.001)	0.29 (0.001)	0.29 (0.001)	0.32 (0.001)
Technical Skills	0.35 (0.001)	0.46 (0.001)	0.28 (0.001)	0.69 (0.001)
Hospital Accreditation				
Medical Center	0.06 (0.125)	0.15 (0.012)	-0.03 (0.534)	0.08 (0.262)
Regional Hospital	0.06 (0.118)	0.19 (0.001)	0.01 (0.880)	0.24 (0.003)
Gender (Male=1)	-	-	-0.07 (0.113)	0.03 (0.721)
Age <sup>&amp;</sup>				
Dummy Range1	0.03 (0.752)	-0.17 (0.950)	-0.06 (0.284)	-0.07 (0.443)
Dummy Range2	0.08 (0.970)	-0.13 (0.949)	-0.05 (0.331)	-0.04 (0.664)
Dummy Range3	0.04 (0.745)	-0.14 (0.949)	0.01 (0.822)	0.16 (0.112)
Education (ref=<7 years)				
7-9	-0.12 (0.078)	-0.20 (0.080)	-0.01 (0.793)	0.10 (0.288)
10-12	-0.14 (0.207)	-0.26 (0.141)	0.03 (0.662)	0.02 (0.833)
>13	-0.09 (0.491)	-0.34 (0.051)	0.09 (0.151)	0.04 (0.695)
-2 LOG L $\chi^2$	239.5 (0.001)	213.4 (0.001)	121.2 (0.001)	169.5 (0.001)
Concordant (%)	73.7	79.5	73.0	83.5

+ Results from logistic regression models presenting standardized  $\hat{\alpha}$  coefficients for patients with C/S or appendectomy. Dependent variables were "Satisfied=1, fair or not satisfied=0" and "strongly recommend and recommend =1, conservatively recommend and not recommend =0" .

& Appropriate dummy variables were created for age groups for C/S and appendectomy respectively. The four categories for C/S were :  $\leq 24$  、 25-29 、 30-34, and  $\geq 35$ . The four dummies for appendectomy were  $\leq 20$  、 21-30 、 31-40, and  $\geq 41$ . The youngest groups were treated as references in the models.

Table5: Determinants of patient satisfaction and recommendation of hospitals from logistic regression models of subjects with chronic diseases+ ( standardized  $\hat{\alpha}$  coefficients, P values in parentheses )

Variables	DM		Stroke	
	Satisfaction	Recommendation	Satisfaction	Recommendation
Inter-personal Skills	0.31 (0.001)	0.30 (0.001)	0.40 (0.001)	0.39 (0.001)
Technical Skills	0.28 (0.001)	0.76 (0.001)	0.20 (0.001)	0.70 (0.001)
Hospital Accreditation				
Medical Center	0.12 (0.007)	0.28 (0.001)	-0.01 (0.651)	0.09 (0.215)
Regional Hospital	0.10 (0.019)	0.09 (0.173)	-0.03 (0.881)	-0.04 (0.487)
Gender (male=1)	-0.01 (0.891)	0.01 (0.882)	-0.03 (0.401)	-0.07 (0.250)
Age (ref=<55 years)				
55-64	0.02 (0.661)	0.00 (0.979)	-0.03 (0.555)	-0.03 (0.654)
65-74	0.02 (0.710)	0.03 (0.699)	0.04 (0.483)	0.07 (0.436)
75+	-0.04 (0.397)	-0.02 (0.785)	0.04 (0.503)	0.03 (0.737)
Education (ref=0 years)				
1-6	-0.09 (0.037)	-0.02 (0.835)	0.06 (0.171)	-0.04 (0.567)
$\geq 7$	-0.04 (0.427)	-0.19 (0.017)	0.04 (0.337)	-0.03 (0.638)
-2 LOG L $\chi^2$	189.1 (0.001)	282.6 (0.001)	220.8 (0.001)	300.9 (0.001)
Concordant (%)	72.5	86.4	72.5	85.3

+ Results from logistic regression models presenting standardized  $\hat{\alpha}$  coefficients for patients with stroke or DM. Dependent variables were "Satisfied=1, fair or not satisfied=0" and "strongly recommend and recommend =1, conservatively recommend and not recommend =0" .