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ABSTRACT

Quality of care rather than price is the main concern in healthcare. However, doesn't price matter at all? To investigate what factors surrounding quality and cost influence whether patients perceive the services as expensive and recommend a hospital to other patients, we analyzed data from a national survey of patients in Taiwan in 2002. A total of 6,725 subjects returned their questionnaires. Results from logistic regression models showed that (1) patient's perceived expensiveness was determined simultaneously with perceived quality and the out-of-pocket price of that care; (2) patient's perceived hospital quality appeared to be the most important determinants for one's recommendation of a hospital; and (3) while the out-of-pocket price did not affect a patient's recommendation, the perceived expensiveness of the services did. The perceived value rather than the price itself is the essence of quality competition in Taiwan's healthcare market.

Keywords: quality of care, price, patient perspective, healthcare market, Taiwan

INTRODUCTION

Non-price competition in health care market

Price competition is less common in the health care market than in other industries. Health care is classified as a non-perfect competitive market due to uncertainty and information asymmetry [1], and it is also considered an industry which markets reputation [2, 3]. Therefore, competition for quality is more often observed in the health care market than price competition [4-6]. A review of the literature from the 1970s and 1980s revealed that a "medical arms race" takes place in the United States health care market; hospitals compete for physicians and their patients by providing most up-to-date medical equipment and excessive staffing [7-10]. Quality competition has led to higher healthcare costs as well as higher price for insurance coverage.

Although quality concern dominates in healthcare, price may still play a role in the marketplace. Reports showed that after the implementation of the pro-competition and cost containment policies in California, the rate of increase in cost per discharge in hospitals in highly competitive markets was lower than the rate of increase in hospitals in low-competition markets [11, 12]. However, a recent study finds non-price competition to be becoming increasingly more common and hospitals to be competing to provide attractive services, including the latest technology, excessive staffing, and lavish amenities, to attract

individual physicians and the patients they serve [13]. "Does price matter at all?" We wonder.

According to consumer choice theory, when the quality of goods or services meets a consumer's expectation and when the consumer considers the price to be worth the services, then consumer satisfaction emerges and consumption of those services continues [14, 15]. However, information concerning quality and price of health care is limited. Patient selection of health care providers has been found to depend greatly on the recommendation of family members and friends [16, 17], and a patient's experience and rating of health care quality significantly influences whether that patient will recommend a hospital [18]. Patients' perceived value of the services and their recommendation of the providers are key features of the competition in health care market.

Taiwan's health care system

The health care service market has always been competitive in Taiwan. In 2002, there were 610 hospitals and 17,618 clinics for western medicine, Chinese medicine and dentistry serving about 23 million people in Taiwan. The National Health Insurance (NHI) program, now covers over 96% of all citizens in Taiwan and has contracts with 95% of the nation's hospitals, was implemented in 1995. When it was implemented, the competition became more intense. Small-scale hospitals were driven out of the market and the expansion of

hospital scale is obvious [19]. Detailed descriptions of the implementation and influence of the nationwide health insurance program are available elsewhere [20-22].

A hospital accreditation system has been implemented since 1978 and classifies hospitals into 3 categories in descending order: medical center, regional hospital, and district hospital [23]. As of 2002, of the nation's 610 hospitals, 23 were medical centers, 71 regional hospitals, 41 district teaching hospitals, 344 district hospitals and 131 non-accredited hospitals. Hospitals without teaching accreditation were mostly small-sized private owned hospitals with less than 100 beds.

Despite universal coverage under Taiwan's NHI system, price variation still exists. Since the Bureau of the National Health Insurance (BNHI) is the only buyer of health care services, it sets payment schemes for various kinds of services for all contracted providers. NHI beneficiaries are required to make a co-payment of 10% of their hospitalization expenses with an upper limit of NT$ 24,000 (US$ 700) per admission, while patients with a low-income certificate are exempted from the co-payment requirement. Hospitals can also charge patients directly for services or medical materials not covered by NHI. For example, there is an extra fee for a stay in single- or double-bed wards, since NHI will only pay for stays in wards with a minimum of three beds. Usually, patients were not aware of the exact

amounts they paid for the co-payment requirement or the extra fee charged.

Without a formal referral requirement or a family doctor system, people in Taiwan are free to choose any of the NHI-contracted hospitals they prefer to receive ambulatory or inpatient services. Virtually the only available information a prospective patient or their family members have to base their choice of on is a hospital's reputation (i.e. what hospitals people are recommending) and bed size [17]. This study investigates the out-of-pocket hospital charges and patient's perceived quality of care and their influence on hospital choice.

MATERIALS AND METHODS

Sources of subjects

A nation-wide survey of discharged patients was conducted to gather information on patients' rating of hospital performance and on the items or services used and out-of-pocket charges. Since the diagnostic and treatment procedures as well the medical expenses might vary significantly among different diseases, we surveyed only patients with certain diagnoses/procedures. After consulting medical professionals and considering the prevalence of the diagnoses for case collection, we chose to survey discharged patients who had one of 4 medical diagnoses (stroke, asthma, pneumonia and diabetes mellitus) or one of 2 surgical procedures (cesarean section and appendectomy). In order to obtain

administrative efficiency this survey only included patients discharged from hospitals designated as district teaching hospitals or above, because the large amount of small-scaled hospitals provides only a small portion (less than 10%) of inpatient services nationwide.

Sample selection was conducted with the help of the BNHI. All of the NHI-contracted hospitals file monthly claims to one of the six regional NHI branches. The branch offices listed patients with the above-mentioned major diagnoses discharged from hospitals accredited as district teaching hospital or higher during January 1, 2002 and March 31, 2002. These lists made up our potential candidates. Patients who expired during the stay in hospital and patients with more than one diagnosis of the 6 disease categories were excluded. A systematic random sampling was conducted to select 50% of the listed patients from each hospital per month with an upper limit of 15 patients per diagnosis. The questionnaires were then mailed to the study patients between 2 to 3 months after discharge. At least 3 telephone calls were made by the employees in the six BNHI branches to encourage participants who had not returned their questionnaires to do so.

Questionnaire design

A structured questionnaire was designed to gather information on the price and perceived quality of hospital care, and the items covered such areas as out-of-pocket charge, type of

ward, length of stay, and the experience medical and nursing care. The questionnaire was first standardized via a small-scaled pilot test on 60 discharged patients. Sampled patients or their primary family caregivers were asked to answer the questionnaire. The questionnaire began with questions to identify the patient's diagnosis and who answered the questionnaire.

Questions about quality of hospital care usually cover many different dimensions [24-26]. After reviewing measurement tools developed by previous researchers and considering our previous experience [18], we selected 10 items to measure two major dimensions of quality of care: clinical competence and the inter-personal skills of the medical staff. Clinical competence was covered with five questions: hospital equipment, doctor's competence, nurse's competence, explanation of treatment, and outcome/recovery status. Questions about inter-personal skills were also covered with five questions: doctor's attitude, doctor's respect, nurse's attitude, nurse's response and nurse's communication.

Each of the 10 questions were designed to have 5-level response categories such as "definitely enough" to "obviously insufficient", "very good" to "very poor", or "much better than expected" to "much worse than expected." Scores ranging from 5 to 1 were assigned to the five response categories. The total possible score for each dimension (clinical competence and inter-personal skills) ranged from 25 to 5. Higher scores represented

better-perceived quality of hospital performance. Missing values in each of the 10 items (from 0.5% to 5.1% of the total number of people surveyed in each category) were replaced by the mean scores for each of the diagnoses in order to maximize the amount of useful information. Patients with different conditions were analyzed separately as suggested by Hargraves et al. to account for possible clinical variations [27].

There was one question about whether a patient would recommend the hospital: "If someone asks you about that hospital, would you recommend it?" The 5 response categories for this question were "strongly recommend" to "definitely not recommend". In a logistic regression model, the first two responses (strongly recommend and recommend) were defined as one group and the remaining responses as the other. In this study, we assumed that hospitals with better perceived quality or more reasonable price was more likely to be recommended by their patients.

Statistical analysis

The means and standard deviations of continuous variables are presented in the description section; some of these variables are presented in ordered categories as needed. Variables measuring out-of-pocket payment, family income, length of stay, interpersonal and technical skill ratings were categorized into 3 levels using the first and the third quartiles as cutoff

points. A multiple logistic regression model was used to examine the effects of patient's rating of quality and out-of-pocket payment on their perceived expensiveness. A second logistic regression model was constructed to investigate the effect of perceived expensiveness, out-of-pocket charge and quality rating on patient's recommendation of hospital. Odds ratios and 95% confidence intervals as well as the significance levels based on chi-square tests were presented to compare the magnitudes of the effects. The analyses were performed using SAS system Version 8.0.

RESULTS

Characteristics of the sample

A total of 17,798 questionnaires were mailed out. After deleting those that had been sent to the wrong address and those mailed to patients who had died since discharge, we ended up with 14,408 valid questionnaires. Returned to us were 6,725 completed questionnaires, giving us an overall response rate of 46.7%. Patients who had undergone the two surgical procedures possessed characteristics different from those with the four medical conditions: they had significantly shorter hospital stays and higher perceived quality of care due to relatively "curable" conditions, and the Cesarean Section patients were females of a narrow span of age. Furthermore, healthcare for these two procedures were reimbursed by NHI's

case-payment scheme rather than a common fee-for-service method, which might influence hospital's charging behavior significantly. In order to simplify the analysis of price, perceived expensiveness and recommendation, this study only included patients diagnosed with one of the four medical conditions (n = 4,492).

Basic survey information about the respondents is shown in Table 1. Males dominated three of the four disease categories except for diabetes. Stroke patients were the oldest group with a mean age of 68 years old. Patients with pneumonia and asthma were much younger and had mean ages around 41 years old. The overall family income was about 41,000 NT dollars per month. The average length of stay was 8.8 days, with stroke patients having the longest (11.5 days). Patients with these four medical conditions did not vary notably in their perception of the hospital's quality of care, technical capabilities and interpersonal skills.

Patients were discharged from medical centers, regional hospitals and district teaching hospitals with the ratios of about 2:6:2, respectively. The distribution of medical diagnoses of the patients being discharged from these hospitals varies to some extent from hospital to hospital. Approximately 50.8% of the patients stayed in insurance-paid wards, throughout their hospital stay, so they did not need to pay for extra ward fees. On the other hand,

11.6% of the patients stayed in single-bed rooms and 37.7% of the patients stayed in double-bed rooms and were charged various extra ward fees by the individual hospitals.

The overall average out-of-pocket charge was about 5,500 NT dollars, with diabetic patients paying the highest (about 7,000 NT dollars). 22.7% of the patients felt that the out-of-pocket charges were very expensive or expensive while 55.7% of the respondents reported that the charges were reasonable. A certain portion of the patients (14.7%) did not answer the question concerning perceived expensiveness; they tended to be older and with lower family income. About 46.2% of the patients reported that they would (strongly) recommend the hospital, while 11.6% of the respondents did not answer the recommendation question. Only 33.4% of the patients answered the questionnaires by themselves.

Out-of-pocket price, perceived expensiveness and recommendation

Simple associations of patient's perceived expensiveness, recommendation of the hospital and related factors are shown in Table 2. 62.6% of the respondents considered the out-of-pocket charges to be reasonable, cheap or very cheap; 37.4% considered them expensive. People with out-of-pocket charges higher than 6,300 NT dollars or with family incomes less than 23,000 NT dollars per month were more likely to report that the charges were expensive (49.8% and 40.9%, respectively). Patients with higher scores of perceived

quality, i.e. interpersonal or technical skill ratings, were less likely to report that the charges were expensive. Patients who had been discharged from a public hospital or had been staying in an insurance ward were more likely to report that the charges were reasonable (67.0% and 69.1%, respectively).

The second part of Table 2 shows the association between patient's recommendation of the hospital and related factors. On average, 46.2% of all the respondents reported that they would recommend the hospital they chose. Patients who reported the charges as expensive were less likely to recommend their hospitals than those reported the charges as reasonable (32.7% vs. 54.3%). The out-of-pocket price, on the other hand, was not associated with the likelihood of recommending a hospital. Patients' perceived quality of hospital care was significantly associated with their recommendations of the hospital. Hospitals with higher accreditation levels were more likely to be recommended: medical centers (58.0%), regional hospitals (45.7%) and district teaching hospitals (36.8%). Hospital ownership was also related to patient's recommendation, with privately owned hospitals being the least recommended (39.0%).

Results of the logistic regression models

Two sets of logistic regression models were conducted to examine the effects of

out-of-pocket charge and other related factors on patient's perceived expensiveness and their recommendation of the hospital, as seen in Table 3. The amount of out-of-pocket charges appeared to be a positive predictor for perceived expensiveness (OR=1.07), while technical capability and interpersonal skill ratings tended to be negative determinants of perceived expensiveness (ORs=0.87 and 0.95). Other factors such as family income, disease category, ward type, hospital accreditation level and its ownership were also significantly associated with perceived expensiveness.

The second part of Table 3 shows the results of patient's recommendation of the hospital. Perceived expensiveness tended to be a significant predictor of patient's recommendation of the hospital (OR=0.56), while the amount of out-of-pocket price showed no effect at all (OR= 1.00 [0.98, 1.02]). We also examined the possibility of collinearity by removing the "perceived expensiveness" from the regression model, the out-of-pocket price still showed no significant effect (OR = 0.99 [0.98, 1.01], and their correlation coefficient was 0.20, $P<0.001$). On the other hand, interpersonal and technical ratings, representing perceived quality of care, appeared to be influential determinants of a patient's recommendation of the hospital, with OR= 1.17 [1.13-1.22] and 1.32 [1.27-1.37], respectively.

DISCUSSION AND CONCLUSION

Results from this study show that perceived quality of hospital care remains the key feature in the competitive healthcare market under Taiwan's universal health insurance scheme, and a patient's perception of the quality of that care appears to be the most important determinant for his or her recommendation of the hospital. The patients' rating of the technical capability and performance of the hospital tended to be more influential than the interpersonal and communication skill ratings, possibly indicating the relative importance of the two dimensions in their perspective. This finding explains the expansion of hospital scale in Taiwan which is similar to the "medical arms race" phenaminum in the United States. Furthermore, under the National Health Insurance in Taiwan people are free to choose among providers, former patients' recommendations of a hospital is one of the key sources of information that consumers use to select among hospitals. The association of perceived quality and recommendation echoes previous reports concerning the quality competition in the health care market. [5, 18]

Given that quality is the main concern of consumers in the health care market, does price matter at all? This study examined the price effect on recommendation in two ways: an absolute value of the out-of-pocket price and a perceived expensiveness of the price versus the services provided in the hospital. Our results showed that out-of-pocket amount was a significant predictor for perceived expensiveness. Not surprisingly, however, the perceived

quality of care appeared to be an important determinant for perceived expensiveness as well. Patients who perceived good quality of care were more likely to report that the price to be reasonable. This finding shows that perceived expensiveness is determined simultaneously with perceived quality of care and the out-of-pocket price of that care, which forms the perceived value of the services. A patient is more likely to recommend a hospital while he/she perceives a higher value, i.e. high rating of quality and/or low cost, which concurs with the marketing theories. [28]

Interestingly, perceived expensiveness was negatively associated with a patient's recommendation of the hospital, but out-of-pocket price did not affect the recommendation. One of the possible explanations was that the out-of-pocket cost, with an average of $5572 NTD or $170 USD, was not "very expensive" in Taiwan (with a GDP of 13500 USD in 2004).[29] However, the finding also reveals that the absolute amount of price may affect patient's recommendation of the hospital only when a patient perceives the hospital as expensive, meaning that he or she does not believe the service is worth the price. In terms of methodological thinking, we consider that perceived expensiveness is the intervening variable between paid price and recommendation. Given a certain level of perceived quality, low out-of-pocket price leads to non-expensive feeling and high paid price result in expensive feeling. The perceived expensiveness then may influence the patient's

recommendation of a hospital. Thus a hospital, such as a large-scaled medical center, can provides quality care and charge higher prices, may also enjoy popular recommendation by patients.

Knowing that healthcare service is not a homogeneous product, we believe that perceived value rather than the price is the essence of quality competition in the healthcare market. However, given its unique value, the validity of having patients evaluate medical performance as a quality measures needs to be further investigated. This study included patients with only certain medical diagnoses; the sample consisted of fewer elderly and low-income subjects. Analysis on a sample with more comprehensive case-mix or under multiple health plans is suggested for future study.

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Table 1: Basic information of discharged patients by the 4 medical conditions

Items	Diabetes	Pneumonia	Stroke	Asthma	Total
N	1,055	1,518	964	955	4,492
Gender（% female）	51.0	41.7	40.0	46.6	44.5
Age（ $\overline{X}$ ±SD）	61.0±16.6	40.1±31.0	68.4±11.8	41.6±29.7	51.4±27.4
Family Income （ $\overline{X}$ ±SD）	35,872 ±30,537	45,763 ±33,605	37,112 ±31,324	43,276 ±29,884	40,996 ±31,904
Length Of Stay （ $\overline{X}$ ±SD）	9.8±8.0	7.5±5.6	11.5±9.4	7.2± 5.7	8.8±7.4
Interpersonal Skill（ $\overline{X}$ ±SD）	19.8±3.0	20.0±2.8	19.8±2.9	20.1±2.9	19.9±2.9
Technical Skill （ $\overline{X}$ ±SD）	19.2±3.3	19.2±3.1	19.1±3.2	19.2±3.2	19.2±3.2
Out-Of-Pocket （ $\overline{X}$ ±SD）	7,004±5,189	5,323±4,848	6,169±5,602	4,889±4,603	5,572±5,072
Perceived expensiveness (%)					
Very Expensive/Expensive	23.5	23.3	20.0	23.8	22.7
Reasonable	55.0	58.2	59.0	55.3	57.0
Cheap / Very Cheap	4.4	5.6	6.2	6.2	5.6
No Answer	17.2	12.9	14.7	14.8	14.7
Hospital Accreditation Level(%)					
Medical Center	18.9	15.6	23.3	21.0	19.2
Regional Hospital	63.3	59.1	60.3	58.5	60.2
District Teaching H.	17.8	25.4	16.4	20.6	20.6
Hospital Ward (%)					
Single-bed Room	8.9	14.3	10.0	11.8	11.6
Double-bed Room	36.0	37.5	41.2	36.3	37.7
Insurance Room	55.2	48.2	48.8	51.9	50.8
Recommend the Hospital（%）					
Strongly Recommend/ Recommend	48.2	45.0	48.0	44.3	46.2
Conservatively/Not Recommend	38.9	44.2	40.7	43.9	42.1
No Answer	13.0	10.8	11.3	11.8	11.6
Self-answer (%)	38.0	34.3	23.9	36.6	33.4

Table 2: Patient's perceived expensiveness and recommendation by associated factors

	Perceived expensiveness (%)	Recommend the hospital (%)
	Expensive	Recommend
Total	37.4	46.2
Perceived expensiveness		
Expensive	-	32.7***
Reasonable	-	54.3
Out-Of-Pocket		
>=6,300 NT$	49.8***	47.2
2,300-6,300 NT$	36.2	44.8
< 2,300 NT$	26.4	46.7
Family Income		
>=60,000 NT$	32.9**	51.7 *
23,000-60,000 NT$	36.8	47.1
<= 23,000 NT$	40.9	45.3
Inter-personal skill		
High	25.6***	65.7***
Medium	35.4	41.0
Low	50.5	16.3
Technical Skill		
High	28.9***	74.0***
Medium	38.4	45.5
Low	52.8	20.9
Hospital Ward		
Single-bed Room	40.2 ***	49.2 *
Double-bed Room	44.8	48.0
Insurance Room	30.9	44.5
Hospital Accreditation		
Medical Center	41.0*	58.0***
Regional Hospital	37.1	45.7

District Teaching Hospital	35.2	36.8
Hospital Ownership		
Public Hospital	33.0	48.8
Non-profit Hospital	39.0	47.7
Private Hospital	41.5	39.0

*P<0.05, ** P<0.01, *** P<0.001 by Chi-square tests for the distribution of perceived expensiveness and recommending the hospital among the categories of individual associated variables.

Table3: Determinants of patient perceived expensiveness and recommendation of a hospital from logistic regression models [1] (N=3916)

Variables	Perceived expensiveness		Recommendation	
	Odds Ratio	95 % C. I.	Odds Ratio	95 % C.I.
Perceived expensiveness (ref: Reasonable)				
Expensive	- -	- -	0.56 ***	0.48 – 0.67
Out-Of-Pocket	1.07 ***	1.05 –1.09	1.00	0.98 –1.02
Inter-personal Skill[2]	0.95 **	0.92 –0.99	1.17 ***	1.13-1.22
Technical Skills[2]	0.87 ***	0.84 –0.90	1.32 ***	1.27-1.37
Hospital Accreditation Level (ref: D. T. H.)				
Medical Center	1.53 ***	1.20 - 1.96	1.93 ***	1.49 –2.50
Regional H.	1.12	0.92 – 1.35	1.41 **	1.16 - 1.72
Hospital Ownership (ref: Private H.)				
Public H.	0.61***	0.50 – 0.76	1.15	0.92 –1.44
Non-profit H.	0.85	0.70 – 1.05	1.06	0.85 – 1.32
Age (ref:>=51 years old)				
≤ 35 years old	1.07	0.86 –1.32	0.77 *	0.61 –0.97
36-50 years old	1.04	0.86 – 1.26	0.87	0.71 –1.07
Family Income (ref: ≤ 23000 NT $)				
≧60001 NT $	0.68**	0.54 –0.87	0.90	0.70 –1.16
60000-23001 NT $	0.83 *	0.69 –0.99	0.91	0.75 –1.09
Hospital Ward (ref: Insurance R.)				
Single-bed R.	1.34*	1.05 – 1.71	1.23	0.95-1.59
Double-bed R.	1.61***	1.37 –1.89	1.09	0.92-1.30
Conditions (ref: Asthma)				
Diabetes	0.99	0.81 –1.22	1.23	0.98 – 1.54
Pneumonia	0.94	0.78 –1.14	1.05	0.86 – 1.29
Stroke	0.67 ***	0.54 – 0.84	1.34	1.06 – 1.69
Self-answer	1.14	0.97 –1.35	1.02	0.85 - 1.21

[1] Results from logistic regression models presenting odds ratio and 95% confidence intervals for comparison. Dependent variables were 〝Perceived expensiveness=1, perceived reasonableness and no answer=0〞 and 〝strongly recommend and recommend =1, recommend with reservation,

not recommend and no answer =0″ .

[2] Missing values to the inter-personal or technical skills variables were replaced by sub-group mean values.

[3]. * P<0.05, ** P<0.01, *** P<0.001