Service Quality in Hospitals: More Favourable Than You Might Think

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Abstract: This paper examines and measures the quality of services provided by private hospitals in Malaysia. Empirical research is used to determine patients' expectations and perceptions of the quality of service, and a comprehensive scale adapted from SERVQUAL is empirically evaluated for its usefulness in the Malaysian hospital environment. Results based on testing the mean differences between expectations and perception indicate that patients' perceived value of the services exceed expectations for all the variables measured. A comparative analysis with similar studies in other regions is reported, and the implications are discussed.

Keywords: service quality, patients, hospitals, SERVQUAL, Malaysia.

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Introduction

The application of quality-management practices by manufacturers and service providers has become increasingly widespread. Recognition of the differences between manufacturing and services through the dimensions of intangibility, inseparability, and heterogeneity of service products (Buttle, 1996; Berry and Parasuraman, 1991; Zeithaml *et al.,* 1990) has enabled quality-management practitioners to develop approaches that have proved effective in improving service quality.

The quality of service—both technical and functional—is a key ingredient in the success of service organisations (Grönroos, 1984). Technical quality in health care is defined primarily on the basis of the technical accuracy of the diagnosis and procedures. Several techniques for measuring technical quality have been proposed and are currently in use in health-care organisations. Information relating to this is not generally available to the public, and remains within the purview of health-care professionals and administrators (Bopp, 1990). Functional quality, in contrast, relates to the manner of delivery of health-care services.

Numerous studies have shown that provision of high-quality services is directly related to increase in profits, market share, and cost savings (Devlin and Dong, 1994). With competitive pressures and the increasing necessity to deliver patient satisfaction, the elements of quality control, quality of service, and effectiveness of medical treatment have become vitally important (Friedenberg, 1997). Although the published literature contains many references to quality and customer perceptions of the medical profession from a clinical perspective, very little research has been conducted into non-clinical aspects of the quality of medical care.

Several studies have proposed that significant variation exists between patient expectation of treatment quality and the perceived service quality of the treatment received, and that this is due to a number of factors related to the service quality of the treatment delivered (Strasser *et al.*, 1995; Butler *et al*, 1996; Kandampully, 1997). Despite the consensus that patient satisfaction in services is important for quality assurance in medical services and hospitals (Laslett, 1994), there is a dearth of empirical information on consumers' acceptance of health-care practices. In particular, no comprehensive study of this subject has been conducted in Malaysia. Given the rapid changes in the Malaysian health-care environment, increasing competitiveness in the health-care industry, and an increasing awareness by patients of customer satisfaction, the present study provides valuable

insights for hospital administrators into the non-clinical aspects of service quality that are most valued by patients.

The rest of the paper is organised as follows. In the next section, the relevant literature on service quality with special reference to medical services is reviewed. Background information on the Malaysian health-care environment is then presented. The subsequent section describes the research methodology. Thereafter, the results of the present study are analysed and discussed in relation to each of the research questions. The paper concludes with a summary and description of the implications of the findings.

Literature review

Service quality and medical care industry

Service quality has become an important research topic in view of its significant relationship to costs (Crosby, 1979), profitability (Buzzell and Gale, 1987; Rust and Zahorik, 1993; Zahorik and Rust, 1992), customer satisfaction (Bolton and Drew 1991; Boulding *et al*, 1993), customer retention (Reichheld and Sasser, 1990), and service guarantee (Kandampully and Butler, 2001). Service quality has also become recognised as a driver of corporate marketing and financial performance (Buttle, 1996).

Service quality also affects customer satisfaction. A popular definition of service quality proposed by Berry *et al.* (1988) is 'conformance to customer specifications'—that is, it is the customer's definition of quality that matters, not that of management. Evans and Lindsay (1999) proposed the view that customer satisfaction results from the provision of goods and services that meet or exceed customer needs. Although it is widely acknowledged that there is a need for quality indicators of patient satisfaction with medical care, very little research in this area exists (Berman-Brown and Bell, 1998).

Several studies indicate that a lower priority is placed on patients' non-clinical expectations of service quality. Carson *et al.* (1998) have stated that some professionals contend that consumers' perception of quality service in health care is distorted due to the inability of patients to judge the technical competence of the medical practitioner with any accuracy. John (1996) believes that medical courses cover technical details and knowledge in detail, but expect students to develop customer-service skills as they become more experienced. The focus of medical practitioners on technical prowess and knowledge is understandable, given the highly complex nature of the

profession and the immense resources that are devoted to the education and training of doctors (Baldwin *et al.* 2002).

To sum up, because patients are often unable to assess the technical quality of medical services accurately, functional quality is usually the primary determinant of patients' perceptions of quality (Donabediam, 1980, 1982). There is growing evidence to suggest that this perceived quality is the single most important variable influencing consumers' perceptions of value, and that this, in turn, affects their intention to purchase products or services (Bolton and Drew, 1988; Zeithaml, 1998).

The expectation–perception gap

Several tools have been developed for measurement of patients' perceptions and expectations. These tools vary in terms of definition, content, and measurement (Uzun, 2001), but the SERVQUAL instrument developed by Parasuraman, Zeithaml and Berry (1988), remains the most widely used to: (i) determine the relative importance of the five dimensions of tangibility, reliability, responsiveness, assurance, and empathy in influencing customer perceptions; and (ii) track quality trends over time.

The SERVQUAL instrument has been empirically evaluated in the hospital environment, and has been shown to be a reliable and valid instrument in that setting (Babakus and Mangold, 1992). Other studies of health-care quality measurement (Canel and Fletcher, 2001; Lam, 1997; Donthu, 1991) have also used the SERVQUAL method of analysis. Berman-Brown and Bell (1998) outlined a patient-centred audit that has been recognised as the first instrument to firmly establish the views of patients. However, as later acknowledged by the authors, even this measure is no more than an adaptation of the SERVQUAL framework (Parasuraman, Zeithaml and Berry 1988, 1991).

The SERVQUAL instrument has been extensively adopted in various industries, and its validity and reliability have been confirmed. Scardina (1994) and Arikan (1999), for example, reported that SERVQUAL was superior in validity and reliability for evaluating patient satisfaction in medical care. However, caution should be exercised, and adaptations must be within the stated guidelines to ensure that the integrity of the instrument is maintained.

The Malaysian medical-care environment

The Malaysian health-care system has been characterised by a strong public-sector component. Historically, all Malaysians have been entitled to treatment at heavily subsidised rates at public hospitals (Barraclough, 2000). Since 1993, coinciding with the general economic prosperity of the region, the number of private hospitals has increased substantially. One of the reasons for this could

be a view among the Malaysian people that publicly funded hospitals no longer provide the kind of quality health care that they require and that they can obtain in private hospitals (Yong, 2000).

Health care and education have been the largest components of Malaysia's budgetary expenditure. Consequently, the government has attempted to shift the burden of health care to the private sector, thereby decreasing its expenditure (Izma and Ng, 1998). Several private hospitals have been established, mainly in the Klang Valley region (including the Federal Territory of Kuala Lumpur) and in other areas in the neighbouring state of Selangor (comprised of Petaling Jaya, Subang Jaya, and Shah Alam), as well as in the major cities and towns of Malaysia. With the economy improving, the public's expectation of health and medical services has changed. Consequently, the government's aim has been to modernise hospitals and clinics and to ensure that they offer quality services (Ng, 2000). The government has also attempted to attract foreigners to seek treatment through the provision of quality services. To this end, the Health Ministry and local providers of medical care have jointly organised an accreditation program by an independent body, the Malaysian Society for Quality in Health (MSQH). The accreditation program emphasises evaluation of the quality of services, education, and training against internationally accepted professional standards. By August 2002, 24 public hospitals and one private hospital were accredited. It is expected that, by 2004, all public hospitals will undergo the accreditation process.

A benchmarking study conducted by Arthur Andersen & Associates reported that local private hospitals needed to be more efficient to service the highly competitive industry. This study suggested the use of best practices as a short-term solution. As a long-term remedy, the study proposed the development and implementation of an information system that can support efficient management decisions on a continuous basis (Shankar, 1998).

Research methodology

Survey instrument

A survey was conducted to measure service quality in private hospitals in Malaysia. The survey instrument was a modified version of SERVQUAL, adapted as recommended by Parasuraman *et al.* (1991). After an initial evaluation by academics and medical practitioners revealed that eight pairs of questions in the original SERVQUAL instrument were either irrelevant to hospital services or caused confusion or frustration among patients, these items were discarded. Elimination of certain questions on these grounds is supported in the literature (Babakus and Mangold, 1992). In addition, in view of the fact that the developers of SERVQUAL have pointed out that the instrument can be

supplemented to fit specific research needs, a new question was added under the dimension of empathy.

The final instrument used for this survey consisted of 15 pairs of matching expectation/perception items. The responses were recorded on a 5-point scale in which “1” indicated “strongly disagree” and “5” indicated “strongly agree”.

The final list of items used for the survey was as follows:

Tangibles

- [1] The hospital should have modern equipment.
- [2] The hospital should have visually appealing facilities.
- [3] Doctors and other employees should have a professional appearance.
- [4] The hospital should have visually appealing materials associated with the service.

Reliability

- [5] The hospital should provide services as promised.
- [6] The hospital should maintain error-free records.

Responsiveness

- [7] Doctors and other employees should offer prompt services to patients.
- [8] Doctors and other employees should be willing to help patients.

Assurance

- [9] The hospital is able to handle patients’ problems.
- [10] Doctors and other employees are able to instil confidence in patients.
- [11] Doctors and other employees must be courteous at all times.
- [12] Doctors should have the knowledge to answer patients’ questions.

Empathy

- [13] Patients should be given individual attention.
- [14] The hospital should have convenient consultation hours.
- [15] Doctors should deal with patients in a caring fashion.

These final 15 pairs of questions were designed to capture the five dimensions of service quality: tangibles, reliability, responsiveness, assurance, and empathy. The first question in each pair was designed to ascertain the quality of service that patients expect from private hospitals. The

second question in each pair was designed to capture the patients' perceptions of the quality of service they actually received from the private hospital.

Data collection

An explanatory statement, a consent form, and a survey questionnaire, together with a reply-paid envelope, were mailed to a sample of a thousand people drawn from patients who had been discharged from five private hospitals across Malaysia within the previous six months. This exercise was undertaken in the first quarter of 2001. A total of 186 responses were obtained in the following five weeks. This represents a response rate of 18.6%. This compares favourably with response rates in other recent studies in the region, and is considered reasonably adequate, given the low rate of responses associated with mail surveys. Of the 186 responses, 36 were not useable due to insufficient and/or incomplete data. This resulted in a total of 150 questionnaires being used in the final analysis.

Analysis

Profile of the respondents

The demographic profile of the respondents is presented in Table I. The largest group of respondents (33%) were aged 26–35 years. The next largest group (22.7%) were aged 18–25 years. Smaller groups of respondents were aged 36–45 years (19.3%) and 46–55 years (14.7%). Female respondents represented a little more than 60% of the survey population.

Take in Table I here'

Personal income was measured in Malaysian ringgit (RM). At the time of the study, RM3.80 was approximately equal to US$1.00. When personal income was examined, 29.4% of respondents had an annual income of RM48,001–RM72,000. They were closely followed by those earning RM30,001–RM48,000 per annum (28.7%) and then those in the income category of RM18,001–RM30,000 (26.7%). Respondents with an income of RM18,000 and below represented 12.0% of the total, whereas those earning above RM72,000 accounted for only 3.3% of the total sample.

In terms of occupation, the largest group of respondents were in 'general administrative/supervisory' (24.7%) and 'professional' positions (21.4%). Those in 'self employed/business owner' positions made up 16.7%, whereas those in the category of 'civil service' represented 14.0% of the sample.

Reliability and validity

To validate the results empirically, appropriate reliability and validity tests of the measurement instrument were undertaken. Reliability refers to the instrument's ability to provide consistent results in repeated uses, whereas validity refers to the degree to which the instrument measures the concept the researcher wants to measure. This provides confidence that the empirical findings accurately reflect the proposed constructs (Flynn *et al*, 1994).

Reliability and unidimensionality

Confirmatory factor analysis (CFA) was conducted to check the unidimensionality of the measure (Stevens 1996; Anderson and Gerbing, 1991), thus ascertaining that each item in the model represents the same measure (Ahire *et al.*, 1996). In the present study, the comparative fit index (CFI) for the five groups ranged from 0.935 to 0.968, confirming strong unidimensionality of the scales in accordance with Byrne's (1994) criterion of a CFI of 0.90 or above.

To ascertain reliability and internal consistency, factor analysis was conducted separately for the scores of *expected*, *perceived*, and the *gap (expectation minus perception)* variables. Table II provides an overview of the mean scores and standard deviations of the five dimensions. The reliability coefficient (Cronbach's alpha) values ranged from 0.6321 to 0.8669. None of the reliability alphas was below the cut-off point of 0.60, which is generally considered to be the criterion for demonstrating internal consistency of new scales (Nunnally, 1978).

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Face validity

Because the service-quality constructs were determined from the literature, their selection can be defended on face value, and face validity is thus ensured (Kaplan and Sacuzzo, 1993).

Content validity

Because the measurement instrument was adapted from the SERVQUAL measure, which has been widely used among researchers and has achieved consensus for the variables under consideration, content validity can be confidently asserted (Bohrnstedt, 1983).

Construct validity

To address construct validity of the study, factor analysis was conducted. Each separate data set was subjected to oblique varimax rotation and this resulted in three factors with eigenvalues greater than 1.00. Parasuraman, Zeithaml and Berry (1991) in their revised service-quality model proposed that service quality can be measured using the five dimensions as reflective indicators. However, in the present study, factor analysis did not identify any meaningful dimensions that conform to the dimensions recommended by the SERVQUAL instrument. This could be due to the highly correlated nature of the five dimensions of service quality. Several earlier studies also failed to validate the SERVQUAL instrument based on responses (Lam, 1997; Babakus and Mangold, 1992). Thus, for further analysis in this paper, the original dimensions on the SERVQUAL instrument are used as the *a priori* dimensions.

Results

Table III provides an overview of the mean scores and standard deviation of the measures between responses for expectations and perceptions. To detect significant differences *t*-test was computed

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With respect to tangibility, the mean scores of the patients' expectations of service quality were generally low. Low scores were observed for the measures of "modern equipment" (mean = 1.85, SD = 0.75), "visually appealing facilities" (mean = 1.89, SD = 0.77), and "professional experience" (mean = 1.90, SD = 0.76). In contrast, the patients' satisfaction scores for all variables in this dimension were higher than expectations.

Patients' expectations for the dimensions of reliability, responsiveness, assurance, and empathy were generally low, as shown in Table III. Surprisingly low scores were obtained for the following: (i) "maintaining error-free records" (mean = 1.53, SD = 0.64) (which falls within the dimension of reliability); (ii) "offers prompt service to patients" (mean = 1.73, SD = 0.65) (falling under the dimension of responsiveness); and (iii) "able to handle patients' problems" (mean = 1.67, SD = 0.55) (under the dimension of assurance). .

The mean scores of perceptions have exceeded expectations for all the measures examined. This indicates that the perceived value of service quality has exceeded the initial expectation for all variables under all dimensions. A comparison of patients' perception levels and their expectations using paired mean *t*-test indicated confirmation in all constructs examined.

A comparison of the gap scores recorded in the present study and another conducted in the context of Hong Kong (Lam, 1997) reveals a number of differences. Using the SERVQUAL scale, the Hong Kong study measured patients' perceptions of health-care quality, with the intention of providing management with additional information for enhancing service quality. Comparing Lam (1997) and the present study, differences were observed in the gap scores in the dimensions of reliability, responsiveness, assurance, and empathy. For almost all of the measures in these dimensions, the patients in Hong Kong had a higher expectation of the services than were actually received. The only exception was the measure described as "when promises to do something, it does". In contrast, in the present study, reality exceeded expectations. This suggests that hospitals in Malaysia provide services that exceed the expectations of patients, whereas there are factors that hospitals in Hong Kong need to address if they are to meet the service expectations of patients. However, some similarities were observed between the two studies. These were in terms of the physical elements (the dimension of tangibility) of service quality ('has up-to-date equipment', 'physical facilities are visually appealing', 'employees are neat in appearance', and 'materials are visually appealing'). The patients' perceptions actually exceeded their expectations, supporting the findings of the present study, which reveals that patients in Malaysia are generally satisfied with the physical elements of service quality.

Another comparative analysis, with a study conducted in Turkey, revealed different results. This study, which was conducted by Uzun (2001), determined the level satisfaction with nursing care at a university hospital in Turkey, again using the SERVQUAL instrument. Based on the expectation and perception scores for the respective service dimensions, Uzun (2001) found that the quality of services were below the expectations of the respondents. The negative SERVQUAL gap score for each of the five dimensions (of tangibles, reliability, responsiveness, assurance, and empathy) indicate a need for overall improvement in service quality. They support the need for nurses to take steps to improve patient satisfaction with better nursing care. The study is in sharp contrast to the current study, in which patients in Malaysia are generally satisfied with the quality of services received from private hospitals.

Managerial implications

The expectation scores obtained indicate that Malaysians have low expectations concerning private health care. This might be due to the fact that most Malaysians rely on treatment in government hospitals, where the costs for medical services are much lower because the government subsidises them by more than 90%. Due to a high reliance in government hospitals—in 2000, approximately 80% of hospital beds in Malaysia were in government hospitals—perhaps patients have not felt the need to look to private hospitals. In addition, the government's efforts to modernise its hospitals through the accreditation exercise have successfully improved the level of service quality. It has been reported that, by 2004, the aim of the government is to at least achieve the processing stage of the accreditation standard based on international norms. One of the government hospitals, which has already achieved accreditation based on Australian health-care standards, is being used as a benchmark (Shankar and Fazim, 2000)

However, the importance of the private sector is not to be underestimated, because the revenue from private hospitals is close to 50% of the health-care industry's total revenue. Furthermore, private hospitals are likely to see competition emerging from the government's plan to corporatise public hospitals as well as to privatise medical services in a bid to increase efficiency of services (Yong, 2000)

An implication of all this is that top management must place emphasis on change management. It has been observed that the running of private hospitals has not been carried out by professional managers. Managers in the industry must use whatever benchmark information that is available to identify potential improvement areas and then use best practices in the industry to improve in these areas. The fact that satisfaction levels are higher that expectations should not allow managers to become complacent. As a long-term solution, it is recommended that hospitals implement, on a continuous basis, an information system that can support efficient management decisions. It has been observed that Malaysian hospitals do not have good databases—comparable, for example, with those of hospitals in the United States. This is necessary because it is only by comparing data with other hospitals that hospitals can gauge their own performances against those of others.

The high perceptions recorded in the present study, which exceed expectations, indicate that Malaysians perceive the quality of service positively. All the attributed measures have exceeded expectations. However, the present findings must be treated with caution because private hospitals

have been mushrooming to cater for the growing affluent population. People's expectations of health and medical services are also likely to change with time.

From a regional perspective, private health care in Malaysia holds great promise for various reasons. First, the aim of the Malaysian government has been to ensure that the country becomes a regional 'hub' for the provision of medical services. Private health care is assuming greater significance because all efforts have been directed towards ensuring more modern hospitals and clinics that offer quality services to attract foreigners to seek treatment in Malaysia. Secondly, this is likely to encourage locals to seek medical treatment locally, thus saving foreign exchange. For these reasons, service firms, which include hospitals, should focus on achieving customer satisfaction and loyalty by delivering superior value—an underlying source of competitive advantage (Woodruff, 1997).

Conclusion

Because perceived quality is an important measure in influencing consumers' value perception and, in turn, in affecting consumers' intention to purchase products or services (Bolton & Drew, 1988; Zeithaml, 1998), the findings of the present study are of importance for hospital administrators in Malaysia with respect to the non-clinical aspects of service quality.

Government efforts to decrease its expenditure on health care, and to modernise hospitals through the accreditation exercise, have successfully improved the level of service quality. In general, in comparison with other countries such as in Hong Kong and Turkey, Malaysian health-care providers seem to be doing a better job in achieving customer satisfaction with regard to service quality.

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Table I Demographic profile of respondents

Age group	**Frequency**	**%**
Less than 18 years	6	4.0
18–25 years	34	22.7
26–35 years	50	33.3
36–45 years	29	19.3
46–55 years	22	14.7
More than 55 years	9	6.0
Gender	**Frequency**	**%**
Male	59	39.3
Female	91	60.7
Income range	**Frequency**	**%**
RM18,000 and below	18	12.0
RM18,001–RM30,000	40	26.7
RM30,001–RM48,000	43	28.7
RM48,001–RM72,000	44	29.3
More than RM72,000	5	3.3
Employment	**Frequency**	**%**
Executive/senior management	17	11.3
General administrative/supervisory	37	24.7
Civil service	21	14.0
Professional	32	21.3
Self-employed/business owner	25	16.7
Unemployed/housewife/retired	18	12.0

Table II Mean scores of dimensions of service quality

Items in each dimension	Expectations			Perceptions			Gap		
	X	SD	Item to total correlations	X	SD	Item to total correlations	X*	SD	Item to total correlations
Tangibility	**α = 0.8107**			**α = 0.8669**			**α = 0.7862**		
Modern equipment	1.85	0.75	0.726	2.89	0.95	0.694	–1.04	1.12	0.610
Visually appealing facilities	1.89	0.77	0.668	2.91	0.92	0.752	–1.02	1.03	0.561
Professional appearance	1.90	0.76	0.655	2.80	0.96	0.720	–0.90	1.03	0.709
Visually appealing materials associated with the service	2.13	0.81	0.651	3.05	0.97	0.711	–0.93	1.10	0.609
Reliability	**α = 0.6469**			**α = 0.6449**			**α = 0.6469**		
Provides services as promised	1.75	0.55	0.539	2.45	0.66	0.574	–0.70	0.81	0.544
Maintains error-free records	1.53	0.64	0.552	2.57	0.94	0.665	–1.04	1.01	0.635
Responsiveness	**α = 0.7304**			**α = .6837**			**α = 0.6321**		
Offers prompt services to patients	1.65	0.64	0.658	2.68	0.80	0.719	–1.03	0.94	0.562
Willing to help patients	1.63	.68	0.720	2.78	0.80	0.609	–1.15	1.00	0.560
Assurance	**α = 0.6984**			**α = 0.7432**			**α = 0.6984**		
Able to handle patients' problems	1.67	0.55	0.601	2.61	0.66	0.623	–0.94	0.80	0.621
Able to instil confidence in patients	1.65	0.66	0.743	2.78	0.88	0.666	–1.13	1.03	0.670
Courteous at all times	1.73	0.65	0.585	2.85	0.88	0.614	–1.11	0.95	0.431
Have the knowledge to answer patients' questions	1.64	0.65	0.651	2.87	0.79	0.627	–1.23	0.89	0.551
Empathy	**α = .7432**			**α = .7457**			**α = 0.6416**		
Given individual attention	1.79	0.70	0.721	2.91	0.79	0.703	–1.12	0.95	0.610
Dealt in a caring fashion	1.69	0.64	0.682	2.87	0.84	0.707	–1.18	0.93	0.667
Convenient consultation hours	1.71	0.70	0.690	2.93	0.92	0.646	–1.21	1.03	0.551

Scores based on a five-point scale ranging from 1 = strongly disagree to 5 = strongly agree

All means significantly different between expected and perception variables at 95% confidence level (2-tailed tests)

Table III Mean testing of variables: responses for expectation and perception

Variables	Expectation		Perception		Paired Difference	t-value
Tangibility						
Modern equipment	1.85	0.75	2.89	0.95	–1.04	10.566*
Visually appealing facilities	1.89	0.77	2.91	0.92	–1.02	10.420*
Professional appearance	1.90	0.76	2.80	0.96	–0.90	–9.041*
Visually appealing materials associated with the service	2.13	0.81	3.05	0.97	–0.93	–9.015*
Reliability						
Provides services as promised	1.75	0.55	2.45	0.66	–0.70	10.003*
Maintains error-free records	1.53	0.64	2.57	0.94	–1.04	11.220*
Responsiveness						
Offers prompt services to patients	1.65	0.64	2.68	0.80	–1.03	12.412*
Willing to help patients	1.63	0.68	2.78	0.80	–1.15	13.430*
Assurance						
Able to handle patients' problems	1.67	0.55	2.61	0.66	–0.94	13.331*
Able to instil confidence in patients	1.65	0.66	2.78	0.88	–1.13	12.564*
Constantly courteous	1.73	0.65	2.85	0.88	–1.11	12.447*
Have the knowledge to answer patients' questions	1.64	0.65	2.87	0.79	–1.23	14.744*
Empathy						
Given individual attention	1.79	0.70	2.91	0.79	–1.12	12.978*
Dealt in a caring fashion	1.69	0.64	2.87	0.84	–1.18	13.708*
Convenient consultation hours	1.71	0.70	2.93	0.92	–1.21	12.863*

∗Items significantly different between expectation and perception scores at 95% confidence level. (2-tailed tests)