HOSTED BY

ELSEVIER

Contents lists available at ScienceDirect

# Asian Pacific Journal of Tropical Biomedicine

journal homepage: www.elsevier.com/locate/apjtb

# Evaluating patients' perception of service quality at hospitals in nine Chinese cities by use of the ServQual scale

Min Li[1#], Douglas Bruce Lowrie[1#], Cheng-Yu Huang[2], Xiang-Chan Lu[3], Ying-Chu Zhu[4], Xing-Hua Wu[5], Mayila Shayiti[6], Qiong-Zhen Tan[7], Hua-Ling Yang[8], Si-Yuan Chen[2], Pan Zhao[2], Sheng-Hua He[4], Xiu-Rong Wang[9], Hong-Zhou Lu[1,10,11*]

[1]*Shanghai Public Health Clinical Center, Fudan University, Shanghai, China; 201508*

[2]*Chongqing Infectious Disease Medical Center, Chongqing, China; 400036*

[3]*The Fourth People's Hospital of Nanning City, Guangxi Zhuang Autonomous Region, Nanning, China; 530023*

[4]*Public Health Clinical Center of Chengdu, Chengdu, China; 610066*

[5]*Infectious Disease Hospital of Honghezhou of Yunnan Province, Honghezhou, China; 661400*

[6]*The People's Hospital of Xinjiang Uygur Autonomous Region, Urumqi, China;830000*

[7]*The People's Hospital of Laibin City the Guangxi Zhuang Autonomous Region, Laibin ,China;546100*

[8]*Affiliated Hospital of Guilin Medical College, Guangxi Zhuang Autonomous Region, Guilin, China; 541000*

[9]*The Second People's Hospital of Zhongshan City of Guangdong Province, Zhongshan, China; 528400*

[10]*Huashan Hospital affiliated with Fudan University, Shanghai, China; 200040*

[11]*Shanghai Medical College, Fudan University, Shanghai, China;2000032*

## ARTICLE INFO

## ABSTRACT

**Objective:** To investigate patients' perception of service quality at hospitals in nine Chinese cities and propose some measures for improvement.

**Methods:** The ServQual scale method was used in a survey involving patients at out-patient and in-patient facilities in Shanghai, Chongqing, Chengdu, Nanning, Guilin and Laibin of Guangxi, Honghezhou of Yunnan, Wulumuqi of Xinjiang and Zhongshan of Guangdong. The data collected were entered and analyzed using SPSS 20.0. Statistical analyses included descriptive statistics, factor analyses, reliability analyses, product-moment correlations, independent-sample *t*-tests, One-way ANOVA and regression analyses.

**Results:** The Kaiser-Meyer-Olkin value for the factor analysis of the scale was 0.979. The Cronbach's α for the reliability analysis was 0.978. All the Pearson correlation coefficients were positive and statistically significant. Visitors to out-patient facilities reported more positive perception than visitors to in-patient facilities on tangibles ($t = 4.168$, $P < 0.001$) and reliability ($t = 1.979$, $P < 0.05$). Patients of 60 years of age and above reported more positive perception than those between 40 and 49 on reliability ($F = 3.311$, $P = 0.010$), assurances ($F = 2.751$, $P < 0.05$) and empathy ($F = 4.009$, $P = 0.003$). For the five dimensions of the scale, patients in Laibin, Guangxi reported the most positive perceived service quality, followed by patients in Shanghai. On the other hand, patients in Chongqing and Nanning and Guilin of Guangxi reported relatively poor perceptions of service quality. Standardized regression coefficients showed statistically significant ($P < 0.001$) positive values for all ServQual dimensions. Empathy ($\beta = 0.267$) and reliability ($\beta = 0.239$) most strongly predicted perception of service quality.

**Conclusions:** Chinese patients perceived service quality as satisfactory. Hospitals in various regions of China should enhance their awareness and ability to serve their patients.

## 1. Introduction

With its huge population and crowded cities, China faces major challenges in control various diseases. China's healthcare system is undergoing major improvements as it strives to keep pace with growing population demands and cope with various diseases. Measures of hospital clinical and budgetary success can indicate strengths and weaknesses in the system, but these in turn fundamentally depend upon the quality of services being provided. Measurements are needed to guide change but service quality can

be difficult to measure.

More accessible for assessment are the perceptions of the participants providing or receiving the services. Government hospitals are center-stage, but differ widely in capabilities even in first-tier cities and play a key role; However, the quality of service that they provide has seldom been independently assessed. Perceptions of service quality as poor can be expected to adversely affect a patient's attendance and compliance with treatments. There were significant differences in perceived quality between hospitals.

The ServQual questionnaire tool was developed for this purpose. In 1982, the Finnish scholar Christian Gronroos first proposed the concept of perceived service quality, and in 1984 he proposed the perceived quality model. In 1985, American scholars Parasuraman, Zeithaml and Berry put forward the gaps model on the basis of the perceived quality model. Parasuraman, Zeithaml and Berry simplified the gaps model to develop a service qualities scale with five dimensions in 1988, and in 1991 they reworded the negative valence questions into positive-valence questions to make the final version of the ServQual scale[1]. The ServQual questionnaire tool has been widely applied to measure performance in the service industries, including medical services at hospitals worldwide[1-12]. The ServQual tool asks for respondents perceptions of service quality with multiple questions under five headings (dimensions) as follows: (1) Tangibility-things perceived by the five human senses; (2) Reliability-consistent performance, free of non-compliance; (3) Responsiveness-prompt and efficient voluntary response to requirements; (4) Assurance- ability of employees to convey trust; (5) Empathy-provision of sensitive individualized care by the organization[10]. The respondents answer a total of 22 questions, each with a score on a five-point scale, from -2, -1, 0, +1 to +2 so that mean scores and statistical differences can be determined.

In 2013, the research of Li and associates showed that patients at a hospital in Shanghai had higher levels of satisfaction with service quality than the clinicans[13-15].

In this study, authors used the ServQual questionnaire tool to assess patients' perception of service quality in nine cities in China that may reflect the impact of national policies. Questionnaires were independently completed by patients in government hospitals in nine cities, *i.e.*, Shanghai, Chongqing, Chengdu, Nanning, Guilin and Laibin in Guangxi, Honghezhou in Yunnan, Wulumuqi in Xingjiang, Zhongshan in Guangdong, in order to identify the factors influencing patients' perceptions of service quality and to indicate strategies for improvement, thus providing references for managers of medical facilities in China and around the world.

## 2. Materials and methods

### 2.1. Object of study

The patients in hospitals of Shanghai, Chongqing, Chengdu, Nanning , Guilin and Laibin in Guangxi, Honghezhou in Yunnan, Wulumuqi in Xingjing, Zhongshan in Guangdong are involved in this study.

### 2.2. Questionnaire design

Between February and May 2013, the ServQual scale for evaluating patients' service quality was designed on the basis of literature review. The scale included two components, *i.e.*, (1) respondents' information and (2) 22 items in the five dimensions of the ServQual scale.

### 2.3. Pre-questionnaire

The questionnaire was pre-tested in June-August on a total of 60 community medical personnel and patients, and the questionnaire's validity and reliability were analysed. In September, the questionnaires were submitted to the Ethics Committee of Shanghai Public Health Clinical Center for review and subsequently received approval [experiment design (GGWSXDJH1)].

### 2.4. Formal questionnaire: deployment, recovery, examination, retention

From October to December, the formal questionnaire was used to assess the perception of service quality of hospital patients in the nine hospitals. A total of 3 201 patient questionnaires were recovered, and 3 071 valid questionnaires were retained after removing those containing logic errors or missing values in more than 5% of the questionnaire. The effective recovery rate was 95.94%. Totals remaining were: Shanghai, 866; Chongqing, 196; Chengdu, 332; Nanning, 944; Guilin, 118; Laibin, 103; Honghezhou, 149; Wulumuqi, 315; Zhongshan, 48.

### 2.5. Code

#### 2.5.1. The personal information of the subjects

Gender: 1 for male, 2 for female; Age: 1 for those equal or less than 29 years, 2 for 30-39 years, 3 for 40-49 years, 4 for 50-59 years, 5 for those equal and over 60 years. Education level: 1 for primary school and below, 2 for middle school, 3 for undergraduate, 4 for master's degree and above. Place of residence: 1 for city, 2 for rural locations. Medical treatment mode: 1 for outpatient patient, 2 for hospitalization patient. Hospital location: 1 for Shanghai, 2 for Laibin, 3 for Honghezhou, 4 for Wulumuqi, 5 for Zhongshan, 6 for Chongqing, 7 for Nanning, 8 for Guilin, 9 for Chengdu.

#### 2.5.2. Questionnaire content

There were 22 questions assessing positivity to the 5 dimensions. Questions about Tangible matters were T1-4, those for Reliability were L5-9, for Responsiveness S10-13, for Assurance A14-17, and for Empathy E18-22. Response to each question was scored using a Likert-type scale 5-point method: -2 was very dissatisfied, -1 was not satisfied, 0 was neutral, 1 was satisfied, 2 was very satisfied. The 3 071 questionnaires were coded from 1 to 3 071.

### 2.6. Data entry, proofreading and analysis

The SPSS 20 statistics package was used for data entry, proofreading and analyses of item reliability and validity. Frequecy analyses were computed using the respondent information and the scores for the 22 items of the ServQual scale to assess the quality of those items and of the test as a whole. The critical ratios (CR) of respondents mean ServQual scores to the total overall mean ServQual score were computed and the respondents then grouped into the 27% with the highest CR and the 27% with lowest CR. Independent-sample *t* test of the 22 item scores between the two groups was done to assess homogeneity. Reliability and validity analyses were performed on the 22 items. Product-moment correlations (Pearson correlation analyses) were conducted on the means of the five dimensions in each version of the ServQual scale to assess the utility of each dimension. Independent-sample *t*-tests were performed using gender, location of residence, and method of seeking medical care and One-way ANOVA were performed on the mean values of the five dimensions against age, level of education and hospital attended to assess the influence of these factors. Simultaneous regression analyses were performed on the mean values of the versions of the ServQual scale with the mean values of the five dimensions as predictors to assess

homogeneity[16,17].

## 3. Results

### 3.1. Reliability analysis and validity analysis

#### 3.1.1. Pre-questionnaire
The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.741, Cronbach's α was 0.934. Pre-questionnaire reliability and validity were deemed effective.

#### 3.1.2. Formal questionnaire
Kaiser-Meyer-Olkin measure of sampling adequacy was 0.979, Cronbach's α was 0.978. The formal questionnaire's reliability and validity were deemed effective.

### 3.2. Descriptive statistics

#### 3.2.1. Subjects information
There were 1963 (63.9%) males and 108 (35.4%) females involved in the study. About 705 (23.0%) were equal or less than 29 years old; 923 (30.1%) were in the age range of 30-39 years; 612 (19.9%) in the range of 40-49 years; 414 (13.5%) in the range of 50-59 years; 395 (12.9%) were equal and over 60 years old. Education level of the participants is as follows: primary school and below, 616 (20.1%); middle school, 1531 (49.9%); undergraduate, 846 (27.5%); master's degree and above, 37 (1.2%). A total of 1510 (49.2%) were city patients, and 1523 (49.6%) were rural patients. About 1937 (63.1%) were outpatients; and 1127 (36.7%) were hospitalized patients. Thus the majority of subjects were male, 30-39 years old, scholars, in outpatients.

#### 3.2.2. Analysis of 22 items in the five dimensions of the ServQual scale of frequency
The average value of the five dimensions of the ServQual scale was 1.049-1.219, indicating that overall the patients felt a high degree of satisfaction with the quality of service (Table 1).

**Table 1**

ServQual scale of 22 items of descriptive statistics.

| Items | N | Mean | SD |
|---|---|---|---|
| T1: Clean and comfortable work environment | 3070 | 1.17 | 0.717 |
| T2: Modern and advanced work equipment | 3063 | 1.11 | 0.711 |
| T3: Office area clearly marked | 3061 | 1.13 | 0.722 |
| T4: Staff with neat and professional appearance | 3068 | 1.28 | 0.646 |
| L5: Staff working time and intensity are appropriate | 3067 | 1.22 | 0.688 |
| L6: Hospital is interested in solving the problems at work | 3068 | 1.14 | 0.727 |
| L7: Hospital is reliable | 3068 | 1.19 | 0.693 |
| L8: Working processes are clear and concise | 3062 | 1.13 | 0.712 |
| L9: Welfare benefits promised by the hospital can be realized | 3062 | 1.14 | 0.714 |
| S10: Hospital can satisfy the staff's working needs | 3068 | 1.11 | 0.733 |
| S11: Hospital is willing to help the staff to solve working problems | 3064 | 1.13 | 0.713 |
| S12: Hospital can process the staff's complaints in a timely fashion | 3046 | 1.05 | 0.732 |
| S13: Hospital can process the staff's major and unexpected events actively | 3059 | 1.10 | 0.754 |
| A14: Hospital is reliable | 3067 | 1.18 | 0.695 |
| A15: Staff feel comfortable at work | 3066 | 1.17 | 0.697 |
| A16: Staff are friendly and polite to each other | 3066 | 1.23 | 0.688 |

**Table 1, continued**

ServQual scale of 22 items of descriptive statistics.

| Items | N | Mean | SD |
|---|---|---|---|
| A17: Hospital pays attention to training of staff's professional knowledge and skills | 3067 | 1.17 | 0.697 |
| E18: Hospital can show concern for individual staff | 3067 | 1.10 | 0.747 |
| E19: Hospital can give personalized care to staff | 3067 | 1.05 | 0.764 |
| E20: Hospital knows staff's needs | 3068 | 1.05 | 0.756 |
| E21: Hospital pays attention to staff's interests | 3068 | 1.02 | 0.782 |
| E22: Hospital pays attention to staff's needs | 3068 | 1.03 | 0.754 |

### 3.3. Determination value-CR

The mean CR of the group of respondents with the lowest 27% of CR scores was 0.8636 and for the high group the CR was 1.500. The differences between the groups in mean scores for the 22 items were highly significant by independent-sample $t$ test ($P < 0.001$) and the questionnaire was validated.

### 3.4. Product moment correlation

Scores for the five dimensions showed highly significant positive correlation with each other (Table 2), showing that the dimensions all made approximately equal contribution to the overall ServQual assessment.

**Table 2**

Pearson correlation matrix of the five dimensions of the ServQual scale.

| | Tangibles | Reliability | Responsiveness | Assurance | Empathy |
|---|---|---|---|---|---|
| Tangibles | 1 | | | | |
| Reliability | 0.818** ($R^2 = 0.669$) | 1 | | | |
| Responsiveness | 0.746** ($R^2 = 0.556$) | 0.857** ($R^2 = 0.735$) | 1 | | |
| Assurance | 0.742** ($R^2 = 0.550$) | 0.830** ($R^2 = 0.689$) | 0.843** ($R^2 = 0.711$) | 1 | |
| Empathy | 0.705** ($R^2 = 0.497$) | 0.794** ($R^2 = 0.631$) | 0.841** ($R^2 = 0.707$) | 0.855** ($R^2 = 0.731$) | 1 |

**: $P < 0.01$, correlations is significant at the 0.01 level (2-tailed test).

### 3.5. Independent-samples t tests

Gender and place of residence made no significant difference to the mean scores in any of the dimensions (not shown). In contrast, medical treatment mode was associated with significant differences in the Tangibles and Reliability dimensions (Table 3).

**Table 3**

Effect of medical treatment mode on patient's scores in the ServQual scale for five dimensions assessed by independent samples $t$ test.

| Test variables | Treatment mode | N | Mean | SD | t | η² |
|---|---|---|---|---|---|---|
| Tangibles | Outpatient services | 1937 | 1.207 | 0.617 | 4.168*** | 0.005 |
| | Hospitalization | 1127 | 1.114 | 0.581 | | |
| Reliability | Outpatient services | 1937 | 1.176 | 0.646 | 1.979* | 0.001 |
| | Hospitalization | 1127 | 1.131 | 0.582 | | |
| Responsiveness | Outpatient services | 1937 | 1.104 | 0.674 | 0.762 n.s. | 0.000 |
| | Hospitalization | 1127 | 1.086 | 0.629 | | |
| Assurance | Outpatient services | 1937 | 1.187 | 0.655 | -0.037 n.s. | 0.000 |
| | Hospitalization | 1127 | 1.188 | 0.594 | | |
| Empathy | Outpatient services | 1937 | 1.036 | 0.722 | -1.347 n.s. | 0.001 |
| | Hospitalization | 1127 | 1.071 | 0.659 | | |

*: $P < 0.05$; ***: $P < 0.001$; n.s.: Not significant.

Outpatients felt higher satisfaction than hospitalized patients in Tangibles ($t = 4.168$, $df = 2467.970$, $P < 0.001$) and Reliability ($t = 1.979$, $df = 2553.545$, $P = 0.048$). There were no significant

differences in the other three dimensions.

### 3.6. One-way ANOVA

Analysis revealed no significant difference associated with education. In contrast, age was a highly significant variable, patients with 60 years of age and older showing higher satisfaction than those

40-49 years old in Reliability [mean diffference (I-J) = 0.125, $P <$ 0.05; $F = 3.311$, $P = 0.010$)], Assurance (I-J = 0.134, $P < 0.05$; $F = 2.751$, $P < 0.05$) and Empathy (I-J = 0.177, $P = 0.004$; $F = 4.009$, $P = 0.003$).

The influence of hospital location upon the satisfaction scores in the five dimensions of the ServQual scale was tested by the Scheffe method of simultaneous comparisons. The results are shown in Table 4.

**Table 4**
Effect of hospital location on patient's scores in the five dimensions of ServQual scale assessed with the Scheffe method of analysis.

| Dimensions | Locations | N | Mean | SD | | SS | df | MS | F | Scheffe |
|---|---|---|---|---|---|---|---|---|---|---|
| Tangibles | Shanghai (A) | 866 | 1.313 | 0.604 | | | | | 23.932*** | A > C |
| | Guangxi, Laibin (B) | 103 | 1.459 | 0.556 | | | | | | A > F |
| | Yunnan, Honghezhou (C) | 149 | 1.107 | 0.441 | | | | | | A > G |
| | Xinjiang (D) | 315 | 1.324 | 0.606 | | Between groups | 66.321 | 8 | 8.290 | | A > H |
| | Guangdong, Zhongshan (E) | 48 | 1.219 | 0.637 | | Within groups | 1060.715 | 3062 | 0.346 | | A > I |
| | Chongqing (F) | 196 | 0.933 | 0.495 | | Total | 1127.036 | 3070 | | | B > C |
| | Nanning (G) | 944 | 1.068 | 0.619 | | | | | | | B > F |
| | Guangxi, Guilin (H) | 118 | 0.864 | 0.526 | | | | | | | B > G |
| | Chengdu (I) | 332 | 1.159 | 0.573 | | | | | | | B > H |
| | | | | | | | | | | B > I |
| | | | | | | | | | | D > F |
| | | | | | | | | | | D > G |
| | | | | | | | | | | D > H |
| | | | | | | | | | | I > F |
| | | | | | | | | | | I > H |
| Reliability | Shanghai (A) | 866 | 1.257 | 0.654 | | | | | 15.116*** | A > F |
| | Guangxi, Laibin (B) | 103 | 1.482 | 0.566 | | | | | | A > G |
| | Yunnan, Honghezhou (C) | 149 | 1.201 | 0.406 | | Between groups | 45.392 | 8 | 5.674 | | A > H |
| | Xinjiang (D) | 315 | 1.270 | 0.621 | | Within groups | 1149.395 | 3062 | 0.375 | | A > I |
| | Guangdong, Zhongshan (E) | 48 | 1.354 | 0.509 | | Total | 1194.787 | 3070 | | | B > F |
| | Chongqing (F) | 196 | 1.028 | 0.487 | | | | | | | B > G |
| | Nanning (G) | 944 | 1.067 | 0.630 | | | | | | | B > H |
| | Guangxi, Guilin (H) | 118 | 0.906 | 0.572 | | | | | | | B > I |
| | Chengdu (I) | 332 | 1.094 | 0.628 | | | | | | | D > F |
| | | | | | | | | | | D > G |
| | | | | | | | | | | D > H |
| | | | | | | | | | | E > H |
| Responsiveness | Shanghai (A) | 866 | 1.154 | 0.721 | | | | | 9.9222*** | A > H |
| | Guangxi, Laibin (B) | 103 | 1.522 | 0.538 | | | | | | B > A |
| | Yunnan, Honghezhou (C) | 149 | 1.139 | 0.466 | | | | | | B > C |
| | Xinjiang (D) | 315 | 1.145 | 0.594 | | | | | | B > D |
| | Guangdong, Zhongshan (E) | 48 | 1.219 | 0.641 | | Between Groups | 33.590 | 8 | 4.199 | | B > F |
| | Chongqing (F) | 196 | 1.028 | 0.539 | | Within groups | 1295.752 | 3062 | 0.423 | | B > G |
| | Nanning (G) | 944 | 1.041 | 0.651 | | Total | 1329.342 | 3070 | | | B > H |
| | Guangxi, Guilin (H) | 118 | 0.900 | 0.647 | | | | | | | B > I |
| | Chengdu (I) | 332 | 1.020 | 0.671 | | | | | | | |
| Assurance | Shanghai (A) | 866 | 1.277 | 0.673 | | | | | 11.719*** | A > D |
| | Guangxi, Laibin (B) | 103 | 1.532 | 0.537 | | | | | | A > G |
| | Yunnan, Honghezhou (C) | 149 | 1.366 | 0.480 | | | | | | B > D |
| | Xinjiang (D) | 315 | 1.090 | 0.607 | | | | | | B > F |
| | Guangdong, Zhongshan (E) | 48 | 1.339 | 0.535 | | Between groups | 36.576 | 8 | 4.572 | | B > G |
| | Chongqing (F) | 196 | 1.114 | 0.523 | | Within groups | 1194.631 | 3062 | 0.390 | | B > H |
| | Nanning (G) | 944 | 1.116 | 0.645 | | Total | 1231.208 | 3070 | | | B > I |
| | Guangxi, Guilin (H) | 118 | 1.081 | 0.560 | | | | | | | C > D |
| | Chengdu (I) | 332 | 1.124 | 0.621 | | | | | | | C > G |
| Empathy | Shanghai (A) | 866 | 1.126 | 0.772 | | | | | 12.855*** | A > D |
| | Guangxi, Laibin (B) | 103 | 1.482 | 0.575 | | | | | | B > A |
| | Yunnan, Honghezhou (C) | 149 | 1.204 | 0.558 | | | | | | B > D |
| | Xinjiang (D) | 315 | 0.879 | 0.563 | | Between groups | 48.874 | 8 | 6.109 | | B > F |
| | Guangdong, Zhongshan (E) | 48 | 1.321 | 0.625 | | Within groups | 1455.159 | 3062 | 0.475 | | B > G |
| | Chongqing (F) | 196 | 1.029 | 0.525 | | Total | 1504.033 | 3070 | | | B > H |
| | Nanning (G) | 944 | 1.010 | 0.701 | | | | | | | B > I |
| | Guangxi, Guilin (H) | 118 | 0.867 | 0.633 | | | | | | | C > D |
| | Chengdu (I) | 332 | 0.958 | 0.735 | | | | | | | C > H |
| | | | | | | | | | | E > D |

n.s.: $P > 0.05$, *: $P < 0.05$, ***: $P < 0.001$.

It can be found from Table 4 that: (1) overall service quality perceived by patients was good, generating the best feeling in the Guangxi Laibin group, followed by the Shanghai group. Xinjiang patients felt good in Tangibles and Reliability, Chengdu patients felt good in Tangibles, Zhongshan patients in Reliability and Empathy, Honghezhou patients in Assurance and Empathy; (2) Patients' perceptions of service quality were poor in some instances. Of the five dimensions, Service quality created the worst feeling in Nanning, Guilin and Chongqi groups. Chengdu patients felt poor in all dimensions except Tangibles. Xinjiang patients felt poor in Responsiveness, Assurance and Empathy, and Honghezhou patients felt poor in Tangibles and Responsiveness.

### 3.7. Simultaneous regression analysis

Patients' responses in the five dimensions of the ServQual scale of service quality were subject to simultaneous regression analysis and the results are shown in Table 5.

**Table 5**
Simultaneous regression analysis of Tangibles, Reliability, Responsiveness, Assurance, Empathy as measures of service quality.

| Predictor variable | B | SE | Beta | *t* |
|---|---|---|---|---|
| Intercept | 0.000 | 0.000 | | 0.838 |
| Tangibles | 0.182 | 0.000 | 0.186 | 872.118[***] |
| Reliability | 0.227 | 0.000 | 0.239 | 840.695[***] |
| Responsiveness | 0.181 | 0.000 | 0.201 | 719.644[***] |
| Assurance | 0.183 | 0.000 | 0.195 | 714.640[***] |
| Empathy | 0.227 | 0.000 | 0.267 | 1040.205[***] |
| $R = 1.000$; $R^2 = 1.000$; Adjusted $R^2 = 1.000$; $F = 13919856.8$[***] | | | | |

[***]: $P < 0.001$. The Standardized regression model was as follows: service quality = (0.186 × Tangibles) + (0.239 × Reliability) + (0.201 × Responsiveness) + (0.195 × Assurance) + (0.267 × Empathy).

It can be found from Table 5 that the variables of the ServQual scale of five dimensions and the service quality criterion variable (multiple correlation coefficient) had a value of 1, indicating a high degree of correlation. The standard five variables of the regression coefficients were positive and effects were positive, indicating that the perceptions of quality moved in parallel. In this regression model, the five measures of service quality, namely, Tangibles, Assurance, Responsiveness, Reliability, and Empathy each had significant influence and enhanced the overall measure of the service quality.

## 4. Discussion

### 4.1. Basic characteristics of the respondents

#### 4.1.1. Demographic characteristics
According to the Report on China's National Economic and Social Development[18], by the end of 2013, China had a male population of 697.28 million (51.2% of the total population) and a female population of 663.44 million (48.8% of the total population). The urban population was 731.11 million (53.73% of total population) and the rural population 629.61 million (46.27% of total population). A total of 238.75 million individuals (17.5% of total population) were 15 years or younger, 919.54 million (67.6%) were between 16 and 59, while 202.43 million (14.9%) were 60 or above. The social characteristics of the samples included in the current study basically match the characteristics of the Chinese population as a whole.

#### 4.1.2. Makeup of the sample
Although the current survey was conducted at hospitals in nine Chinese cities, there were a large proportion of respondents with

lower levels of education who were rural residents, particularly among patients visiting out-patient facilities[19]. These results reflect the current situation in China. First, although China has established a medical care system with three tiers to cover both urban and rural locations, the allocation of medical resources is uneven; the best resources are concentrated in the cities. Meanwhile, the local and community-based medical care systems have insufficient capacity to provide services; they cannot properly fulfill the function of providing primary care. Rural patients still have to seek treatment for major and serious illnesses in the cities. Second, with the acceleration of urbanization in China, more and more rural residents move to the cities for work. According to a survey, after the spring festival, 50.1% of the respondents were migrant workers in first-tier cities, 30% of them had chosen to work in second and third-tier cities, while only 13.8% had chosen to work in counties and towns nearby their home villages[20]. Migrant workers of rural origins have relatively low levels of education. In the context of these factors, the characteristics of the sample in this research matched the demographic characteristics of the Chinese population.

### 4.2. Perceptions of service quality

The patients' overall perceptions of the quality of the services provided by the hospitals were satisfactory. Although China is a developing country, the Chinese government values and respects human life, cares for disadvantaged groups and has implemented regulatory policies to guide Chinese hospitals in providing services for patients. These policies set the standards for hospitals' accreditation and for evaluation of the presidents of hospitals[21]. Two features in common to patients perceptions at all of the hospitals are noted here.

The first one is that visitors to out-patient facilities reported more positive perceptions on Tangibles and Reliability. The out-patient facilities are the front-display and name-card of the hospitals. Chinese hospitals at various levels all pay great attention to the environment they provide for their patients and place strong emphasis on improving the services at the service windows. Because of China's large population and lack of land space, several patients often stay in one room at in-patient facilities in the hospital, sharing a common wash-room with each other. The cleanliness of the ward is determined collectively by all the patients staying in it. The bed-sheets are changed according to the level of intensity of the patient's care. For example, sheets are changed once a week for patients who receive 2nd or 3rd grade care, twice a week for those under 1st grade care (or anytime when it is needed). Some patients are sensitive to the odor of the disinfectants used in the hospital. Therefore, visitors to out-patient facilities have different feelings about the cleanliness and comfort of the environment in the hospital. Additionally, visitors to out-patient facilities tend to have less serious conditions which are easier to improve than those staying at in-patient facilities. Relief of the patients' suffering from illness is the only way to make these patients feel satisfied and generate high perception of Reliability and loyalty to the hospital[22].

The second feature is that patients above 60 years of age had more positive perceptions on Reliability, Assurances and Empathy than those between 40 and 49. There is an ancient saying in China. "By the age of 40, one is no longer confused. By the age of 60, one no longer hears only pleasing words." This saying means that when people reach the age of 40, they have enough experience and judgment so that they no longer feel confused about the situations they face. Therefore, it is easy for people of this age group to

discover problems when they receive medical treatment, thus leading to lower perception of satisfaction. However, when people reach the age of 60 and enter into late adulthood, they are supposed to let things happen naturally and refrain from emotional upheavals in order to avoid physical and psychological disharmony, which in turn lead to physiological disturbances. This situation may lead patients over 60 to lower their expectations for medical treatment, thus increasing their perception of satisfaction.

### 4.3. Analyses of the differences in patient's satisfaction with service quality between the nine Chinese cities

Patients' satisfaction with medical services is not related to geographic region, the size of the city, the size of the hospital or the accreditation level of the hospital. The hospitals involved in this study are located in nine Chinese cities, *i.e.*, Shanghai, Chongqing, Chengdu, Wulumuqi of Xinjiang, Nanning, Guiling and Laibin of Guangxi, Honghezhou of Yunnan and Zhongshan of Guangdong. These cities are located in the Eastern, Central, Western and Southern parts of China. Shanghai and Chongqing are cities under the direct jurisdiction of the central government. Chengdu, Wulumuqi and Nanning are provincial capitals in China. Guilin and Laibin of Guangxi, Honghezhou of Yunnan and Zhongshan of Guangdong are small cities in China. The hospitals in Shanghai, Chongqing, Chengdu, Nanning and Zhongshan are the sole local designated hospitals for treating contagious diseases in their respective cities. The hospitals in Wulumuqi, Guilin and Honghezhou are the largest general hospitals in their respective cities. Patients in Laibin of Guangxi reported the most positive perception in all the samples, followed by patients in Shanghai. Patients from Chongqing and Guilin and Nanning reported the most negative perceptions, followed by patients from Chengdu. Differences of perception that tended to be related to different hospitals are discussed below.

Patient perceptions of service quality are related to the service awareness and abilities of the hospitals' high-level management and clinicians.

The People's Hospital of Laibin, Guangxi was first established in 1951. The city of Laibin had a regional per capita GDP of 42 183 RMB in 2012, lower than that of Nanning and Guilin[23]. Moreover, most of the samples from Laibin consisted of patients with contagious diseases. The People's Hospital of Laibin pays close attention to the patients' psychological wellbeing and clarifies their most urgent needs. They use personalized methods of psychological consultation to help the patients maintain good mental status while receiving treatment, thus ultimately helping the patients overcome their difficulties through psychological adjustment and cooperation with the clinicians in the treatment.

Shanghai is the more advanced city in terms of hardware and software in all aspects in China, with a strong awareness of service. At the hospital included in this study, the management departments include an Office for Spiritual Civilization, which collects data on patient satisfaction monthly. This hospital has also actively participated in the project entitled Ten-Thousand-Patient-Survey, which covered patients visiting the emergency rooms, in-patient and out-patient facilities. Evaluation results based on that survey are used as important criteria in competition for the title of Civilized Work Unit of the City of Shanghai. Therefore patients from Shanghai reported relatively high levels of satisfaction with the hospital's service quality.

The sample from Xinjiang consisted of patients with contagious diseases. The doctor taking care of these patients was a female doctor of the Uygur ethnicity. She had wanted to be a doctor since her childhood and had shown great passion for solving the problems of contagious diseases. She devoted herself to the treatment of contagious diseases since this type of disease gained recognition in Xinjiang. She has overcome the prejudice of the society and in her own family, and arranged her family members to serve as Red Ribbon advocates. There was a shortage of clinicians but a large number of patients in the Xinjiang facility; although the patients from Xinjiang reported positive perceptions on Tangibles and Reliability, they showed low levels of perceived quality on Responsiveness, Assurances and Empathy.

The Hospital of Zhongshan, Guandong was established in 2008 as an independent hospital for contagious diseases. It had formerly been the Department of Contagious Diseases of the People's Hospital of Zhongshan, Guangdong. This hospital is the newest among all the hospitals in the nine cities surveyed in this study. Since its recent establishment, the hospital has recruited many outstanding medical professionals, thus greatly improving its standards of medical treatment. Additionally, the patients in the sample from Zhongshan were all staying at an in-patient facility. Correspondingly, the Zhongshan patients reported positive perceptions on Reliability and Empathy.

The First People's Hospital of Honghezhou, Yunnan was established in 1950. It currently has nearly 1 000 employees, including about 800 clinicians. It has 663 open beds and receives 21 000 out-patient and emergency room visits and 21 000 patients for in-patient treatment per annum. Because of the sufficient number of clinician staff at the hospitals, the sample of Honghezhou patients reported positive perceptions on Assurances and Empathy. However, these patients have reminded the Honghezhou Hospital of Yunnan to further improve its treatment quality, make the environment of the hospital more beautiful and optimize the procedures for obtaining treatment.

The hospital sampled in Guilin is an out-reach branch of Hospital Affiliated to Guilin Medical College. Located in Lingui County, it ranks the most inferior in terms of resources among all the hospitals surveyed. For example, patients have to go to the main facility of the hospital for certain examinations (*e.g.*, CT), which means travelling 30 km for a round-trip. Sometimes the patients have to travel back and forth multiple times when the doctors at the two facilities fail to coordinate on scheduling. Such situations tend to generate patients' dissatisfaction.

The Nanning Hospital of Guangxi has nearly 700 employees. It is the largest hospital in Guangxi that is specialized for treatment of contagious diseases such as liver diseases, tuberculosis and AIDS. In recent years, there is an increase in such patients in Guangxi[24]. Due to the large number of patients and a shortage of clinicians, patients from Nanning, Guangxi showed negative perceptions of service quality. The hospitals in Chengdu and Chongqing have similar situations to those of the hospital in Nanning, Guangxi. These are hospitals designated for the treatment of contagious diseases in Chengdu, Chongqing and the Southwestern region in general. Sichuan and Chongqing are locations with huge populations and serious epidemics of contagious diseases[19,24]. These three hospitals have the same characteristics in shortage of clinicians and overwhelming numbers of patients. The hospital in Nanning was still under construction during the survey. The construction work exerted negative impact on the patients during treatment. The hospital in Chongqing was established in 1943, while the hospital in Chengdu moved to its new facilities in 2013. Therefore patients at the Chengdu hospital showed more positive perceptions on Tangibles.

## 4.4. Chinese hospitals should undergo more management professionalization

The quality of the treatment should be improved. The quality of the treatment is clearly an important factor for improving a patient's level of satisfaction. The improvement of management quality requires the concerted participation and efforts of the hospital and personnel at all levels of the medical facilities[19]. Having high quality medical personnel is the key factor for improving the hospitals' quality of treatment. The hospitals should improve the treatment and service skills of the clinicians at various levels through training; providing outstanding employees with timely reward is an effective method for hospitals to improve the quality of treatment[10].

The scope of services should be expanded. The hospitals must understand the patients' needs, stand in the patients' shoes, effectively control costs, increase patients' levels of satisfaction and loyalty. Patient loyalty should be one of the goals for strategic development for hospitals and medical facilities[8,25].

In conclusion, Chinese patients perceived service quality as satisfactory. The quality of the treatment should be improved. The hospital management should be professionalization.

## Conflict of interest statement

We declare that we have no conflict of interest.

## Acknowledgements

## References

[1]   Su Q. [*Service quality, relationship quality and customer satisfaction-model, method and application*]. Beijing: Science Press; 2010. Chinese.

[2]   Aghamolaei T, Zare S. Quality gap of educational services in viewpoints of students in Hormozgan University of medical sciences. *BMC Med Educ* 2008; **8**: 34.

[3]   Sajjadi H, Vameghi M, Ghazinour M, Khodaeiardekani M. Caregivers' quality of life and quality of services for children with cancer: a review from Iran. *Global J Health Sci* 2013; **3**: 173-82.

[4]   Mohammadi A, Mohammadi J. Evaluating quality of health services in health centres of Zanjan district of Iran. *Indian J Public Health* 2012; **56**: 308-13.

[5]   Butt MM, de Run EC. Private healthcare quality: applying a SERVQUAL model. *Int J Health Care Qual Assur* 2010; **23**: 658-73.

[6]   Jiang P, Bai M, Xu YH. [Application of SERVQUAL model in the evaluation of hospital service quality]. *Zhejiang Clin Med J* 2009; **8**: 887-8. Chinese.

[7]   Jing XB, Han QK. Application of Servqual model in surgical nursing service quality evaluation. *Chin J Mod Nurs* 2011; **17**: 444-6.

[8]   Anbori A, Ghani SN, Yadav H, Daher AM, Su TT. Patient satisfaction and loyalty to the private hospitals in Sana'a, Yemen. *Int J Qual Health Care* 2010; **22**(4): 310-5.

[9]   Lin DJ, Li YH, Pai JY, Sheu IC, Glen R, Chou MJ, et al. Chronic kidney-disease screening service quality: questionnaire urvey research evidence from Taichung city. *BMC Health Serv Res* 2009; **9**: 239.

[10]  Babakus E, Mangold WG. Adapting the SERVQUAL scale to hospital services: an empirical investigation. *Health Serv Res* 1992; **26**: 767-86.

[11]  Rocha LR, Veiga DF, e Oliveira PR, Song EH, Ferreira LM. Health service quality scale: Brazilian Portuguese translation, reliability and validity. *BMC Health Serv Res* 2013; **13**: 24.

[12]  Clark WR, Clark LA. Measuring functional service quality using SERVQUAL in a high-dependence health service relationship. *Health Care Manag (Frederick)* 2007; **26**: 306-17.

[13]  Li M, Wu YL, Yuan T, Shi H, Huang BY, Lu YH. [Using ServQual scale to evaluate the hospital medical service quality]. *Chin Hosp Manag* 2014; **34**: 40-3. Chinese.

[14]  Li M, Li X, Lu HZ. [Study on the perceived quality of service of clinic patients and staffs of a hospital in Shanghai and a centers for disease control and prevention in Guangdong]. *China Med Herald* 2014; **16**: 109-15. Chinese.

[15]  Li M, Lu HZ. [ServQual scale for assessment of perceived service quality of hospital staff]. *Chin Health Qual Manag* 2014; doi: 10.13912/j.cnki.chqm.2014.21.4.16. Chinese.

[16]  Guo XH. [*Investigation and statistical analysis in medical field*]. Beijing: People's Medical Publishing Press; 2009. Chinese.

[17]  Wu ML. [*Practice of Questionnaire Statistical Analysis SPSS Operation and Application*]. Chongqing: Chongqing University Press; 2010. Chinese.

[18]  National Bureau of Statistics of China. Statistical Communique of the People's Republic of China on the 2013 national economic and social development. China: National Bureau of Statistics of China; 2014. [Online] Available from: http://www.stats.gov.cn/english/PressRelease/201402/t20140224_515103.html [Accessed on 25th September]

[19]  Ministry of Health of the People's Republic of China. *China health statistics yearbook 2012*. Beijing: Peking Union Medical College Press;  2012. p. 325.

[20]  People's Daily. [How to blossom dream for the hometown to which people cannot return?] People's Daily. 2014 Feb 11; Sect. 5. Chinese.

[21]  National Health and Family Planning Commission of the People's Republic of China. Policy information. China: National Health and Family Planning Commission of the People's  Republic of China. [Online] Available from: http://www.nhfpc.gov.cn/zhuzhan/gfxwj/lists.shtml [Accessed on 8th September, 2014]

[22]  Cho WH, Lee H, Kim C, Lee S, Choi KS. The impact of visit frequency on the relationship between service quality and outpatient satisfaction: a South Korean study. *Health Serv Res* 2004; **1**: 13-33.

[23]  *Guangxi Zhuang Autonomous Region Bureau of Statistics: Guangxi statistical yearbook 2013*. Beijing: China Statistics Press; 2013.

[24]  Li M, Shen Y, Jiang X, Li Q, Zhou X, Lu H. Clinical epidemiology of HIV/AIDS in China from 2004-2011. *Biosci Trends* 2014; **1**: 52-8.

[25]  Jung M, Hong MS. Positioning patient-perceived medical services to develop a marketing strategy. *Health Care Manag (Frederick)* 2012; **31**: 52-61.