MEASURING HEALTHCARE SERVICE QUALITY FOR INPATIENT AT THE NATIONAL HEART INSTITUTE AT BACHMAI HOSPITAL IN VIETNAM

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https://doi.org/10.32827/ijphcs.6.3.143

ABSTRACT

Objective: A survey was conducted for measuring healthcare service quality for inpatient at national public general hospital in Hanoi, Vietnam using the Tools of both in the SERVQUAL model and John E. Ware model.

Methods: Cross-Sectional study. The study obtained feedbacks from inpatients over one month from January 2014 to February 2014; after inpatients finished their inpatient care at the hospital, they were asked 30 questions following the tool of both in functional and technical quality, using the five generic dimensions (the original 22 scores) of SERVQUAL instrument to combine with the one dimensions (8 scores) of John E. Ware model, each question can score from 1-5.

Results: In total, 325 patients were interviewed and completed the survey. Levels of inpatient satisfaction about service quality is influenced by the tool with 6 items (30 score), All dimension (6 dimension) have reliability coefficient > 0.05; and Cronbach alpha coefficient of the model’s 0.932: Including the first is Reliability (5 score), the second is Responsiveness (4 score), the third is Assurance (4 score), the fourth is Empathy (4 score), the fifth is Tangible (5 score), and the sixth is Technical quality (8 score) with highly Corrected Item-Total Correlation of four construct of patient satisfaction in healthcare service quality (from 0.646 to 0.837). Overall, the level of highly inpatient satisfaction about quality of healthcare in the hospital was explained almost 73.954% what could be achieved.

Conclusions: Adjusted research model for the hospital has six construct from levels of inpatient satisfaction about healthcare service quality is influenced by the tool with 6 factors (30 score). The tool provides feedback on the service quality for medical examination and treatment process of a public hospital experience from the adult inpatient’s perspective at the developing nation as Vietnam.

Keywords: Measuring healthcare service quality, inpatient, SERVQUAL, John E. Ware model.
1.0 INTRODUCTION

1.1. Introduction of the modeled hospital

Bachmai Hospital is the significant Public general hospital in Vietnam: Bachmai Hospital is one of the biggest hospital in Vietnam. Although Vietnam is now a developing country [1], [2], Bachmai Hospital has combined advanced technology system and expertise resource in healthcare and medical practice education on the top in Vietnam. Bachmai Hospital is a multi-field medical facility in Hanoi and is considered on of the largest in Vietnam. The hospital was established in 1911.

Vietnam National Heart Institute is one big unit belong to Bachmai Hospital, from an unit of Bachmai hospital with only 50 sickbeds, after 25 years, the institute has become one of top hospitals in the north in particular and in Vietnam in general, with application of advanced and low-cost medical techniques, such as transcatheter aortic valve implantation or percutaneous coronary intervention, that have saved thousands of patients suffering from fatal heart diseases in the northern region of Vietnam. Currently, Vietnam National Heart Institute also developed completely with over 300 staffs (including 96 doctors with many highly of professional and over 205 staffs are nursings as well as other staffs).

1.2. Introduction of the Tool

Parasuman et al (1985, 1988), and many authors were developed a conceptual model of service quality (SQ). It had five gaps that the clients’s evaluation of SQ. The Gap 5 on the diagram designs the difference between clients’s expectations and customers’s perceptions, helped to as the perceived SQ [5], [11-12]. Some researchs were identified that have relationship between perceived SQ with patient satisfaction (PS) [13-14].

1978, Gronroos described service quality as both technical and functional; the first meaning what the customer gets and the latter how the client receives the service [3-4]. 1984, Gronroos noted that the quality of service as perceived by clients had two dimensions: “Functional dimension and Technical dimension”, called the model of “technical-functional quality”[3-4].

During the past decade various tools have been developed to measure SQ, with researches not being able to agree which is superior. The credit for pioneering SQ research goes to Pararuraman et al (1985, 1988, and 1994). SQ has been approached as a multidimensional construct [5-6].

The entire approach that customers have expectations of SQ performance; they observe the performance and later expectations of SQ performance; they observe the performance and later form performance perceptions (Sureshchandar & Rajendran, 2001). underscores the link between SQ dimensions and the factors that influence customer expectations. Rust and Olive noted that the SERVQUAL instrument captured the crux of what SQ might mean, the meaning’s a comparison to excellence in service by the clients (Source: Rust and Olive, 1994). The Customer assessment of SQ as can be seen Zerthaml authour (Source: Zerthaml et al., 1990, p.23). SERVQUAL instrument is used to assess consumers’s expectation and
perceptions regarding SQ in many field as the grocery stores, banks, travel, hotel, hospitals...[4-9].

In hospital, SERVQUAL instrument is not enough dimension to measure for technical quality of patient care; Perhaps, there’s a great need for a new model on the tool, we feel a need to add one more dimension to the tool by John E. Ware model [10], it’s meaning the model of “SERVQUAL - John E. Ware model”.

Measures healthcare by SERVQUAL instrument has been the predominant method used to measure consumer’s perceptions of service quality by consumers; It has five generic dimensions or factors (the original 22-item instrument) includes (1) Reliability: Ability to perform the promised service dependably and accurately. (2) Responsiveness: Willingness to help customers and provide prompt service. (3) Assurance (including competence, courtesy, credibility and security): Knowledge and courtesy of employees and their ability to inspire trust and confidence. (4) Empathy (including access, communication, understanding the customer): Caring and individualized attention that the firm provides to its customers. (5) Tangibles: Physical facilities, equipment and appearance of personnel [5-9].

In addition, using the John E. Ware model (publication in Health and Medial Care Services Review, 1978 from the U.S. Department of Health) to measure for technical quality of healthcare (Questionnaire items refer to eight dimension are: ability, accuracy, experience to details, avoid mistakes, give good examinations, and clearly explain what is expected of their patients), and it was used to measure technical quality of patient Care in many hospitals [10].

2.0 METHODS

2.1. Study Area

Patients who were underwent examined and treatment process in Vietnam National Heart Institute at Bachmai General Hospital.

2.2. Selection of Respondents

Adult - Inpatients in Vietnam National Heart Institute at Bachmai Hospital were chosen for the survey. Selection of study set and sampling of patients:

\[ n = \frac{N \times Z^2_{a/2} \times p \times q}{\epsilon^2 \times (N - 1) + Z^2_{a/2} \times p \times q} \]

Where \( N \) is the population size, \( p = 1 - q \) represents the yes/no categories, \( Z_{a/2} \) is CDF of normal distribution and finally \( \epsilon \) is the error term. Since we have \( p = 0.5 \), \( Z_{a/2} = 1.96 \) and \( \epsilon = 0.05 \). The results confirm that the number of questionnaire is sufficient for this survey [5].
For the research in Vietnam National Heart Institute at Bachmai hospital, where considering a population of over 3,000 inpatients visit per month to Vietnam National Heart Institute at Bachmai hospital with selection value of \( p = 0.5 \), a level of confidence's 95% and \( \epsilon = 0.05 \) confidence interval, the minimal sample was calculated as 373. Therefore, for the present research, based on the estimated population size of 170, then a minimum sample size of 170 would be representative to the population and the results of the present research sample can be safely generalized to the population. In the current research, a sample of 325 individuals was collected.

### 2.3. Tools of measuring healthcare service quality

Model of research for this SQ survey by tools of the both in functional and technical quality. Measuring service quality healthcare by tools of combiner model of SERVQUAL (measuring functional quality) and John E. Ware model (measuring technical quality of healthcare) contains six dimensions with 30 items: Each item can be scored from 1 to 5. Measure functional quality by “SERVQUAL” instrument (five dimensions with 22 scores) [5] & Technical quality by “Technical quality of Care” instrument of John E. Ware model (8 scores) as follow [10]:

**H1a: Reliability (IVA):** When hospital promises to do something by a certain time, they do it (A1). Hospital/staff have notification to avoid mistakes (A2). Hospital perform the services for me right at the first time (A3). Doctors are clearly explained and reference to comments patients before appoint medical tests (A4). When customer has a problem, Doctors/staff exhibits sincere interest in solving patients’ problems (A5).

**H1b: Responsiveness (IVB):** Hospital staff make information easily obtainable in explanation of procedures or services provided (B1). Doctors/staffs give prompt services to customers (B2). Doctors/staffs are always willing to help patients (B3). The Doctors are never too busy to respond to customers requests (B4).

**H1c: Assurance (IVC):** Attitude and behavior of Doctors/staff make confidence in customers (C1). Patients feel secure in receiving medical care (C2). Hospital staff are polite to customers (C3). Doctors/staff have knowledge to answer customers’ questions (C4).

**H1d: Empathy (IVD):** Hospital make sure choice individualised of patients (D1). Operating hours of hospital are convenient to Customers (D2). Doctors focus attention what most worried patients (D3). Employees of hospital understand the specific needs of their customers (D4). Hospital staff guide patients where to go and what to do (D5).

**H1e: Tangibles (IVE):** The hospital’s equipment is modern equipments and well maintained (E1). Physical facilities are virtually appealing (E2). Doctors and staff are well dressed and appear neat (E3). Clean, comfortable and Visually attractive environment (E4).

**H1f: Technical Quality (IVF):** Doctor’s office has everything needed to provide complete care (F1). Doctor make me confidence that their diagnosis is correct (F2). I belive in results tests of machines system, technology at the hospital is accurate (F3). I have seen Doctors/staff very experience with my medical problems (F4). Cooperation between doctors,
nurses and other hospital staff about your treatment (F5). My doctors are very competent and well-trained (F6). When I go for medical care, they are careful to check everything when treating and examining me (F7). Doctors/staff have explained thoroughly medical conditions to patients (F8).

**Demographic Variables (DM):**
- DM1: Gender (0 = male, 1 = female):
- DM2: Level of Education (0 = undergraduate, 1 = Degree, 2 = masters, 3 = doctorate):
- DM3: Income Level: Monthly income (0 = under 200 USD, 1=201 to 500 USD, 2 = 501 to 1000 USD, 3 = 1001 to 2000 USD, 4 = above 2000 USD).

**2.3.1. Interval Measurement for Inpatient Satisfaction of Service quality:**

This measurement has the power to measure the distance between any two points on the scale. Respondents are to provide answers on their expectations and perceptions based on the 5-point Likert scale. 1 implies SD - Strongly Disagree, 2 implies D - Disagree, 3 implies N – Neither disagree nor agree, 4 implies A – Agree, 5 implies SA – Strongly agree [5], [11].

**Independent Variables (IV) and Dependent Variables (DV):** Dependent variable (DV) is Service Quality (SQ). Independent variables (DV) are (1) Reliability, (2) Responsiveness, (3) Assurance, (4) Empathy, (5) Tangibles and (6) Technical Quality.

**2.3.2. Research Hypotheses:**

For the purpose of this research, we argue the new tool indexes are reliable and all six dimensions of inpatient satisfaction in service quality by the SERVQUAL (22 score) and Technical quality of care of John E. Ware model (8 score) are significant in the setting of healthcare.

- H1a (Hypothesis 1a): There is a relationship between Reliability and Service Quality.
- H1b (Hypothesis 1b): There is a relationship between Responsiveness and Service Quality.
- H1c (Hypothesis 1c): There is a relationship between Assurance and Service Quality.
- H1d (Hypothesis 1d): There is a relationship between Empathy and Service Quality.
- H1e (Hypothesis 1e): There is a relationship between Tangibles and Service Quality.
- H1f (Hypothesis 1f): There is a relationship between Technical quality and Service Quality.

**2.3.3 Analysis of variance (ANOVA):**

One–way ANOVA was performed to find a difference in the quality assessment of healthcare services according to demographic variables (gender, level of education, income level), with these assumptions:

(H3a): There is a difference in satisfaction levels between the gender groups
(H3b): There is a difference in satisfaction levels between the level of education groups
(H3c): There is a difference in satisfaction levels between the monthly income level
From the analysis, some suggestions were proposed to improve the quality of healthcare, ensure patient satisfaction for general clinic department at this hospital.

2.3.4. Questionnaire Administration:

Questionnaires were completed by inpatients at the modeled hospital (n= 325) over a period of one month. All data analysis has been carried out with the Statistical Package for Social Sciences (IBM SPSS 21.0) [15], [16].

3.0 RESULTS

From the samples characteristics in the Public hospital: There is a 325 questionnaire were distributed and completed, frequency distribution of gender in the hospital are 132 males (40.6%) and 193 females (59.4%).

3.1. Descriptive statistics and Reliability (Cronbach Alpha) of Healthcare quality variables

Table 1: Descriptive Statistics of the Inpatient Satisfaction in the BachMai hospital:

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>N</th>
<th>Mean ± SD (Std. Deviation)</th>
<th>Items (Score)</th>
<th>Reliability (Cronbach Alpha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Relaxation (IVA)</td>
<td>325</td>
<td>4.0911 ± 0.58590</td>
<td>5</td>
<td>0.842</td>
</tr>
<tr>
<td>2 Responsiveness (IVB)</td>
<td>325</td>
<td>4.0608 ± 0.65142</td>
<td>4</td>
<td>0.849</td>
</tr>
<tr>
<td>3 Assurance (IVC)</td>
<td>325</td>
<td>4.1654 ± 0.59460</td>
<td>4</td>
<td>0.837</td>
</tr>
<tr>
<td>4 Empathy (IVD)</td>
<td>325</td>
<td>4.1114 ± 0.51162</td>
<td>5</td>
<td>0.794</td>
</tr>
<tr>
<td>5 Tangibles (IVE)</td>
<td>325</td>
<td>4.1869 ± 0.49170</td>
<td>4</td>
<td>0.797</td>
</tr>
<tr>
<td>6 Technical Quality (IVF)</td>
<td>325</td>
<td>4.2227 ± 0.49669</td>
<td>8</td>
<td>0.914</td>
</tr>
<tr>
<td>SQ</td>
<td>325</td>
<td>4.1525 ± 0.46947</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

All items (30 score) have Cronbach Alpha > 0.7, All dimension (6 dimension) have reliability coefficient > 0.7; Therefore, there is no dimension of study in the hospital is move, ensure conditions for inclusion in the alalysis model.

3.2. Exploratory Factor Analysis (EFA) for Public hospital

After performing IVA (5 variables), IVB (4 variables), IVC (4 variables), IVD (5 variables), IVE (4 variables), and IVF (8 variables) factor analysis have KMO = 0.756 (>0.5) with sig. =
0.000, KMO = 0.794 (>0.5) with sig. = 0.000, KMO = 0.795 with sig. = 0.000, KMO = 0.821 (>0.5) with sig. = 0.000, KMO = 0.770 (>0.5) with sig. = 0.000, and KMO = 0.871 (>0.5) with sig. = 0.000 (<0.05) in Bartlett's test of sphericity, respectively. Therefore suitable to conditions of factor analysis. IVA have only one component was extracted is drawn with variance extracted is 61.445%. IVB have only one component was extracted is drawn with variance extracted is 69.656%. IVC have One factor only one component was extracted is drawn with variance extracted is 67.487%. IVD have only one component was extracted is drawn with variance extracted is 55.043%, IVE have only one component was extracted is drawn with variance extracted is 62.194, IVF have only one component was extracted is drawn with variance extracted is 65.211%.

Results of EFA were showed that all score (30 variables) in the EFA analysis had factor loading > 0.5 (n = 325), so all variables are accepted

**Table 2: Exploratory factor analysis for public hospital**

<table>
<thead>
<tr>
<th>2a. KMO and Bartlett’s Test</th>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</th>
<th>0.893</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett’s Test of Sphericity</td>
<td>Approx. Chi-Square</td>
<td>1580.963</td>
</tr>
<tr>
<td></td>
<td>Df</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
<td>0.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2b. Principal Component Analysis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

<table>
<thead>
<tr>
<th>2c. Component Matrix a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
a. 1 components extracted.
Continues to performing factor analysis of 30 variables with 6 dimensions (6 factors) as above (IVA, IVB, IVC, IVD, IVE, and IVF), we have 6 elements are drawn with KMO = 0.893 (>0.5), the result had the Bartlett test of sphericity with significant = 0.000 < 0.05. It explained 73.954% of the difference of these variables.

After performing factor analysis of six construct with IVA (5 variables), IVB (4 variables), IVC (4 variables), IVD (5 variables), IVE (4 variables), and IVF (8 variables) factor; we have six elements are drawn:

**Factor 1** (IVA-Reliability) includes the following 5 variables (IVA1, IVA2, IVA3, IVA4, IVA5).

**Factor 2** (IVB - Responsiveness) includes the following 4 variables (IVB1, IVB2, IVB3, IVB4).

**Factor 3** (IVC - Assurance) includes the following 4 variables (IVC1, IVC2, IVC3, IVC4).

**Factor 4** (IVD - Empathy) includes the following 5 variables (IVD1, IVD2, IVD3, IVD4, IVD5).

**Factor 5** (IVE - Tangibles) includes the following 4 variables (IVE1, IVE2, IVE3, IVE4).

**Factor 6** (IVF–Technical Quality) includes the following 8 variables (IVF1, IVF2, IVF3, IVF4, IVF5, IVF6, IVF7, IVF8).

### 3.3. Reliability for SERVICE QUALITY (SQ) of Model for Public hospital:

Cronbach Alpha of factor and Model for Public hospital: IVA factor had Coefficients Corrected Item-Total Correlation of eighth construct of IVA are IVA1 = 0.606, IVA2 = 0.638, IVA3 = 0.738, IVA4 = 0.603, and IVA5 = 0.657. IVB factor had Coefficients Corrected Item-Total Correlation of eighth construct of IVB are IVB1 = 0.534, IVB2 = 0.762, IVB3 = 0.752, and IVB4 = 0.731. IVC factor had Coefficients Corrected Item-Total Correlation of eighth construct of IVC are IVC1 = 0.676, IVC2 = 0.714, IVC3 = 0.706, and IVC4 = 0.594. IVD factor had Coefficients Corrected Item-Total Correlation of eighth construct of IVD are IVD1 = 0.563, IVD2 = 0.591, IVD3 = 0.581, IVD4 = 0.573, and IVD5 = 0.569. IVE factor had Coefficients Corrected Item-Total Correlation of eighth construct of IVE are IVE1 = 0.612, IVE2 = 0.639, IVE3 = 0.554, and IVE4 = 0.630. IVF factor had Coefficients Corrected Item-Total Correlation of eighth construct of IVF are IVF1 = 0.672, IVF2 = 0.754, IVF3 = 0.789, IVF4 = 0.727, IVF5 = 0.659, IVF6 = 0.664, IVF7 = 0.755, and IVF8 = 0.721.

The construct of IVA, IVB, IVC, IVD, IVE, and IVF have Cronbach alpha coefficient = 0.911, = 0.911, 0.907, 0.909, 0.931, and 0.912, respectively. All the variable in service quality have coefficients of Corrected item - Total Correlation are greater than 0.3.
Table 3: Reliability for Service Quality (SQ) of Public hospital:

<table>
<thead>
<tr>
<th>Reliability Statistics</th>
<th>Cronbach's Alpha Based on Standardized Items</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cronbach's Alpha</td>
<td>0.928</td>
<td>0.932</td>
</tr>
<tr>
<td>N of Items</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

The six construct of Service Quality (SQ) have Cronbach alpha coefficient = 0.928 (> 0.7), ensure conditions for inclusion in the final model.

3.4. Adjusted research model for Public hospital:

Through the above analysis results showed that 6 factors (components) of the original scale service quality after performing factor analysis, there is no one factor not achieve that distinction is worth understanding and guarantee, worth six factors distinguish drawn, which were: Factor 1 (IVA-Reliability) had 5 variables, Factor 2 (IVB - Responsiveness) had 4 variables, Factor 3 (IVC - Assurance) had 4 variables, Factor 4 (IVD - Empathy) had 5 variables, Factor 5 (IVE - Tangibles) had 4 variables, and Factor 6 (IVF–Technical Quality) had 8 variables.

When applied to the analysis of inpatient at public hospital achieved the distinction is clear (it looks almost the difference), become a separate element can not removed from the model.

Thus, the initial research model through factor analysis results are adjusted as follows (Table 4):

Table 4: Summary of Hypotheses Findings in Public hospital:

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>(H1): There is a relationship between Reliability factor (IVA) and Service quality (SQ)</td>
<td>Supported</td>
</tr>
<tr>
<td>(H2): There is a relationship between Responsiveness factor (IVB) and Service quality (SQ)</td>
<td>Supported</td>
</tr>
<tr>
<td>(H3): There is a relationship between Assurance factor (IVC) and Service quality (SQ)</td>
<td>Supported</td>
</tr>
<tr>
<td>(H4): There is a relationship Empathy factor (IVD) and Service quality (SQ).</td>
<td>Supported</td>
</tr>
<tr>
<td>(H5): There is a relationship Tangibles factor (IVE) and Service quality (SQ).</td>
<td>Supported</td>
</tr>
<tr>
<td>(H6): There is a relationship Technical Quality factor (IVF) and Service quality (SQ).</td>
<td>Supported</td>
</tr>
</tbody>
</table>
3.5. Inspection of model service quality research.

3.5.1. Correlation analysis (Pearsom coefficient) for Public hospital

Table 5: Cronbach Alpha of Service Quality model of the Results in the Public hospital

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Tot Correlation</th>
<th>Squared Multiple Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVA</td>
<td>20.7472</td>
<td>5.637</td>
<td>0.810</td>
<td>0.695</td>
<td>0.911</td>
</tr>
<tr>
<td>IVB</td>
<td>20.7775</td>
<td>5.339</td>
<td>0.821</td>
<td>0.713</td>
<td>0.911</td>
</tr>
<tr>
<td>IVC</td>
<td>20.6728</td>
<td>5.537</td>
<td>0.837</td>
<td>0.765</td>
<td>0.907</td>
</tr>
<tr>
<td>IVD</td>
<td>20.7268</td>
<td>5.902</td>
<td>0.833</td>
<td>0.703</td>
<td>0.909</td>
</tr>
<tr>
<td>IVE</td>
<td>20.6513</td>
<td>6.387</td>
<td>0.646</td>
<td>0.528</td>
<td>0.931</td>
</tr>
<tr>
<td>IVF</td>
<td>20.6155</td>
<td>6.004</td>
<td>0.815</td>
<td>0.711</td>
<td>0.912</td>
</tr>
</tbody>
</table>

The independent variable (1) reliability, (2) responsiveness, (3) assurance, (4) empathy, (5) tangible media and (6) technical quality are not correlated with each other because they are the factors that are estimated through factor analysis process.

The Dependent variables of Service Quality (SQ) for each independent variable are correlation with each other independent variables, through specific expressions of correlation coefficient as follows: IVA (0.810), IVB (0.821), IVC (0.837), IVD (0.833), IVE (0.646), and IVF (0.815) is calibrated (2-tailed) was statistically significant at the 0.01 level. Preliminarily we can conclude the independent variables included in the model can to explain the dependent variable of Patient satisfaction (PS).

3.5.2. Multiple Linear Regression analysis for Public hospital (Pearsom coefficient):

![Figure 1a: Component Number (Result of Extration Method: Principal Component Analysis): 30 factors](image1a)

![Figure 1b: Component Number (Result of Extration Method: Principal Component Analysis): 6 Component](image1b)
Table 6: Linear regression of Service Quality (SQ) of the Results in the Public hospital

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>-0.008</td>
<td>.017</td>
<td>-0.468</td>
<td>0.640</td>
</tr>
<tr>
<td>IVA</td>
<td>0.174</td>
<td>.006</td>
<td>0.217</td>
<td>30.775</td>
</tr>
<tr>
<td>IVB</td>
<td>0.112</td>
<td>.005</td>
<td>0.156</td>
<td>21.497</td>
</tr>
<tr>
<td>IVC</td>
<td>0.160</td>
<td>.006</td>
<td>0.203</td>
<td>25.320</td>
</tr>
<tr>
<td>IVD</td>
<td>0.108</td>
<td>.007</td>
<td>0.117</td>
<td>16.457</td>
</tr>
<tr>
<td>IVE</td>
<td>0.211</td>
<td>.005</td>
<td>0.221</td>
<td>39.015</td>
</tr>
<tr>
<td>IVF</td>
<td>0.237</td>
<td>.007</td>
<td>0.251</td>
<td>34.695</td>
</tr>
</tbody>
</table>

a. Dependent Variable: SQ

Thus, summary of Hypothesis Finding in Public hospital is the initial research model through factor analysis results were adjusted as above (Table 3).

Figure 2: The histogram of residuals
3.6 Analysis of variance (ANOVA) for Public hospital

The result of the analysis of variance ANOVA gender, ANOVA education, ANOVA income level indicated that $F$ value had no significant with Sig. = 0.000 (less than 0.05), Sig. = 0.707 (Greater than 0.05), and Sig. = 0.029 (less than 0.05), respectively. Therefore, it had no significant difference in inpatient satisfaction between different education groups; but it had significant difference in patient satisfaction between different genders, and income level groups. Thus, (H3b) hypothesis is rejected; Remaining (H3a) and (H3c) hypothesis are accepted.

4.0 DISCUSSION

4.1 Descriptive statistics and Reliability (Cronbach Alpha) of Healthcare quality variables

The result show that Patients feel that the quality of medical services at the public hospital models are pretty good, but still not really good for the perception of the patients using the service at this hospital (Table 1) [10-11].

Reliability of the instrument helped to provides consistency in the results and the Cronbach alpha was used to measure the reliability of the data. Overall Cronbach Alpha of public hospital data long with service quality construct provided values greater than 0.7 (Table 1), Wich is acceptable [15-16].

4.2 Exploratory Factor Analysis (EFA) for SERVICE QUALITY of Public hospital

Factor analysis discovered 6 EFA with quality service components (Table 2): After performing factor analysis of Service quality (IVA, IVB, IVC, IVD, IVE, IVF) with 30 variables as above (22 items of functional quality and 8 items of technical quality), We have 6 elements are drawn with KMO> 0.5, significant < 0.0001, the mean that the sample size was matches for the factor analysis technique. Therefore, it is suitable for the conditions of factor analysis (Table 2a) [15-16]. The model (6 factors: IVA, IVB, IVC, IVD, IVE, and IVF) explains almost 73.954% with variance extracted, the remainder (26.064%) were difficult explained by the factors andvariables in this framework (Table 2b) [15-16].

Results of EFA were indicated that value for factor loading of all variables are more than 0.5; therefore, all those items (30 variables) are accepted [17].

Continous, the rotation converged in 6 iterations were consistent with the researcher model have found in this research. So, this model has been proven to be the most suitable measurement for service quality for the current research model. Thus, factor analysis has demonstrated that the model is constructedform 6 major constructs (IVA, IVB, IVC, IVD, IVE, IVF), it has been completed the demonstration of the component matrix factor rotation and structures of the study [15-16]. In summary, after performing factor analysis, we have six elements are drawn (Table 2c) as follow:
Factor 1 (IVA-Reliability) includes the following 5 variables (IVA1, IVA2, IVA3, IVA4, IVA5).

Factor 2 (IVB - Responsiveness) includes the following 4 variables (IVB1, IVB2, IVB3, IVB4).

Factor 3 (IVC - Assurance) includes the following 4 variables (IVC1, IVC2, IVC3, IVC4).

Factor 4 (IVD - Empathy) includes the following 5 variables (IVD1, IVD2, IVD3, IVD4, IVD5).

Factor 5 (IVE - Tangibles) includes the following 4 variables (IVE1, IVE2, IVE3, IVE4).

Factor 6 (IVF–Technical Quality) includes the following 8 variables (IVF1, IVF2, IVF3, IVF4, IVF5, IVF6, IVF7, IVF8).

4.3. Cronbach Alpha of factor and Service Quality Model for Private hospital

All the dependent variables (IVA, IVB, IVC, IVD, IVE, and IVF) of Service Quality (SQ) had Cronbach alpha coefficient > 0.6, and all the variables (IVA, IVB, IVC, IVD, IVE, and IVF) in service quality (SQ) have coefficients of Corrected item – Total Correlation is greater than 0.3 (Table 2), So, satisfactory inspection, that ensures conditions for inclusion in the next model analysis [15-16].

4.4. Adjusted research model for Public hospital

Through the above analysis results showed that 6 factors (components) of the original scale service quality after performing factor analysis.

Therefore, worth six factors distinguish drawn, and the initial research model through factor analysis results are adjusted as above (Table 4).

4.5. Inspection of model service quality research.

4.5.1. Correlation analysis (Pearsom coefficient) for Public hospital

Multivariate regression analysis was performed to examine the relationship between the independent variable (Pearson correlation of the IVA, IVB, IVC, IVD, IVE, and IVF factors are 0.810, 0.696, 0.821, 0.837, 0.833, 0.646, and 0.815, respectively) with the dependent variable (Service quality) in research model. Before conducting linear regression analysis, the consideration of linear correlation between the independent variables and the dependent variable between the independent variables together is work to be done and the Pearson correlation coefficient in the matrix system correlation is appropriate to consider this relationship.

The value of the dependent variable and the independent variable is the factor (factor score) was calculated through SPSS factor analysis, is the linear combination of the observed variables in the service quality scale standardized [15-16].
The independent variable (1) reliability, (2) responsiveness, (3) assurance, (4) empathy, (5) tangible and (6) technical quality are not correlated with each other because they are the factors that are estimated through factor analysis process.

The Dependent variables of Service Quality (SQ) for each independent variable are correlation with each other independent variables, through specific expressions of correlation coefficient as follows: IVA (0.810), IVB (0.821), IVC (0.837), IVD (0.833), IVE (0.646), and IVF (0.815) is calibrated (2-tailed) was statistically significant at the 0.01 level. Preliminarily we can conclude the independent variables included in the model can to explain the dependent variable of Service quality (SQ).

4.5.2. Multiple Linear Regression analysis for public hospital

Multiple Linear Regression analysis for Public hospital:

Performed multivariate regression analysis to examine each specific independent variables: The Reliability (IVA), Responsiveness (IVB), Assurance (IVC), Empathy (IVD), Tangible (IVE), and Technical quality (IVF) affects the quality of service (dependent variable) how.

The regression equation best satisfaction of quality of service as follow:

\[ Y = -0.008 + 0.174 \times \text{Reliability (IVA)} + 0.112 \times \text{Responsiveness (IVB)} + 0.160 \times \text{Assurance (IVC)} + \\
0.108 \times \text{Empathy (IVD)} + 0.211 \times \text{Tangible (IVE)} + 0.237 \times \text{Technical quality (IVF)}. \]

Results of regression models tested showed no multicollinearity phenomenon occurs because the magnification factor variance (Variance Inflation Factor - VIF) of the variables in the model are very low, ranging from 0.108 to 0.237 less than 10 (Table 6) [15-16].

Results of testing statistical F value, the value of sig. = 0.000 shows a linear regression model fit multiple data sets, are used (Table 6) [15-16].

Value sig. of the independent variables Reliability, Responsiveness, Assurance, Empathy, Tangible media and Technical quality are less than 0.05 in the model mean (Table 6) [15-16].

The study results show that; sig. value of Variables are Reliability, Empathy, Tangible and Technical quality with the absolute value of residuals respectively. Thus linear regression model building above can be used.

Check the histogram of residuals (Figure 2) show approximate distribution of standardized residuals (Average mean = -6.33E-14 and standard deviation Std. Dev. = 0.991 ie close to 1). Therefore, it can be concluded that the normal distribution assumption was not violated [15-16].

Check items scatter plot between the normalized residuals (Standardized Residual) and standardized predicted values (Standardized predicted value) indicates residues randomly distributed, not form a specific shape (Table 6, Figure 2). Thus, the linear contact and equal variance were met.

Thus, the regression equation is presented as appropriate. Technical quality factor with regression coefficient = 0.237 and Beta = 0.251, is the most influential part satisfaction of the service quality; Six factors with regression coefficient (from 0.108 to 0.237) and Beta (from
0.117 to 0.251) is the same influential part satisfaction of the service quality; although the model had beta of Standardized Coefficients’s other different between variables (Table 6 and Figure 3) [15-16].

4.5.3. **Summary of Hypotheses Findings in Private hospital**:

Thus, the initial research model through factor analysis results are adjusted as follow (Table 6, Figure 3):

![Adjusted research model summary of service quality in Private hospitals.](image)

**Figure 3: Adjusted research model summary of service quality in Private hospitals.**

Summary of Hypotheses findings in private hospital: The initial research model through factor analysis results are adjusted as showed in Table 4, Table 6 and Figure 3.

\[
Y = -0.008 + 0.174 \times \text{Reliability (IVA)} + 0.112 \times \text{Responsiveness (IVB)} + 0.160 \times \text{Assurance (IVC)} + 0.108 \times \text{Empathy (IVD)} + 0.211 \times \text{Tangible (IVE)} + 0.237 \times \text{Technical quality (IVF)}.
\]

4.6. **Analysis of variance ANOVA for Private hospital**

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[https://doi.org/10.32827/ijphcs.6.3.143](https://doi.org/10.32827/ijphcs.6.3.143)
Group theory about the difference in quality evaluation of healthcare services quality according to demographic variables (gender, level of education, income level). After analysis of variance (ANOVA) for Public hospital, result of the analysis of variance ANOVA gender, education groups, and income level groups showed that two hypothesis (H3a, H3c) are accepted, and one hypothesis (H3b) is rejected, it’s meaning that researchers can see the no difference in the assessing of the service quality respectively under the "Gender", between the "level of education" and between "monthly income level" in the model of public hospital. Thus, the service will be not suitable for all customer groups.

The difference in the assessing of the quality respectively under gender by there are risk factors for cardiovascular disease depend on genders (male or female), such as hypertension, coronary artery disease, etc… [18-20].

Among there patients, in addition to patients who have been medical treated with medications, many inpatients were underwent other interventions, such as electrophysiology intervention, percutaneous coronary intervention, transcatheter aortic valve implantation intervention, and surgeries; therefore, the additional payments are depend on each technique, each treatment method, and treatment process for each patient, although almost they were reduced cost by health insurance [18-20].

5.0 CONCLUSIONS

Tools of the both in SERVQUAL (five dimensions with 22 item) and John E. Ware model (one dimension with 8 item) is the firth of its kind for the public hospitals in Vietnam’s one developing country; Research can see the levels of inpatient satisfaction about healthcare Service quality which is influenced by the SERVQUAL (5 dimensions with 22 scores) are reliability (5 scores), Responsiveness (4 scores), Assurance (4 scores), Empathy (5 scores), Tangible (4 scores), and Technical quality of care of John E. Ware model (8 scores). It’s good new tool in measuring healthcare service quality.

The tool provide a valid and reliable scale that can be used to measuring healthcare service quality, the strong points and strong weaks defined in healthcare services quality of hospital by feedback of clients. Therefore, We hope that the Tool can be used for measuring the quality of medical examination as well as service quality in many countries including developed and developing countries. While the survey revealed depressing feedback, the motivation of the senior management to identify areas of concern and measure patient satisfaction is a step in the right direction. There would not be any scope to improve the services unless such bold steps at measuring client satisfaction is pursued. Perhaps, repeating such studies at regular interval of say one month or per three months will be a useful guide for material intervention in development strategy for the hospitals.
CONFLICTS OF INTEREST DISCLOSURE

This is the first time for this research is combiner model of SERVQUAL and John E. Ware model has been applied in the field of measuring for healthcare service quality for inpatient at public hospital in developing country and in the World; Therefore, the authors declare they have no conflicts of interest.

REFERENCES


