

## **A VALID AND RELIABLE EGYPTIAN INSTRUMENT FOR IDENTIFYING BARRIERS INFLUENCING MANAGING AND IMPROVING QUALITY IN NURSING SERVICE**

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**ABSTRACT:** *Background:* when aiming to improve quality of care in nursing service, it is essential to recognize and understand the barriers that may hinder the success of TQM programs before and during implementation. *Objective:* to develop a valid and reliable Egyptian instrument for identifying barriers influencing managing and improving quality in Egyptian nursing service from Egyptian nurses' perspective views. *Methods:* Across sectional descriptive questionnaire. The study comprises 530 nurses out a total of 729 nurses. The response rate was 75.4%. The validity and reliability tests were performed. *Results:* Egyptian instrument measure 42 barriers and covering 8 major obstacles. Internal consistency reliability was acceptable. The instrument has content validity and construct validity based on factor analysis with varimax rotation component matrix. *Conclusion:* The instrument is being used in Egyptian health care organizations for identifying barriers that may hinder managing and improving quality in nursing service.

**KEYWORDS:** Egyptian, instrument, barriers, managing, improving, quality

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### **INTRODUCTION**

In today's, competition is becoming ever more intense in global organizations. Many organizations are trying very hard not only to satisfy their customer's needs but where possible exceed them. This can only be achieved through cost reduction, improvement in performance, and increased customer satisfaction. <sup>(1)</sup> Health care organization like any organization facing much pressure and challenges to improving the efficiency and competitive advantages in relation to cost effectiveness and quality of care. <sup>(2)</sup> In order for health care organization to survive and grow in the future, it is essential that they deliver high quality of care. <sup>(1)</sup> Adopting quality of care in health care system is not new, but it is actually found in the nursing process since Florence century. <sup>(3)</sup>

Nationally and internationally, work with quality of care and quality improvement (QI) has been a continuously ongoing process in health care system and nursing service <sup>(4)</sup>, nevertheless there are many barriers impede implementation of TQM in health care system and nursing service. <sup>(5,6)</sup> These barriers including cultural and employee barrier; infrastructure barrier; lack of planning for quality; lack of customer focus and leadership for quality; lack of motivation and skills; lack of knowledge and management; lack of management commitment and leadership; lack of understanding quality and TQM and inadequate of resources for TQM. <sup>(5,6)</sup> The barriers to implementing TQM are so many and it is important for all hospital administrators and health care practitioners in general and for all nursing managers and nursing staff in particular to understand and address these barriers both before and during TQM implementation for achieving desired results. <sup>(7)</sup>

Worldwide, it is evident from many researches that only one instrument has been used to identify and investigate barriers of TQM implementation in health care and non health care institutions. (2,4,5,8-12). In Egypt, up to the knowledge of current researchers, data concerning presence of instrument for measuring nurses' perception of barriers that hinder managing and improving quality in nursing service is seriously lacking. Development an instrument for identifying barriers of implementation TQM in Egyptian nursing service are important for health policy-makers and health care authorities to identify targets for managing and improving quality in nursing service. In recent years, managing and improving quality in nursing service has increased significantly and continues to gain momentum. Implementation of total quality management in nursing service significantly improves quality of nursing care, increases satisfaction of nurses and patients to more sustainable, achieves greater efficiency in nursing care, optimizes nurses' productivity and achieves better desirable patient care outcomes or nursing care outcomes. (5) The present study is indented to produce some baseline data in this respect and develop a valid and reliable Egyptian instrument for identifying barriers influencing managing and improving quality in Egyptian nursing service from Egyptian nurses' perspective views.

## **MATERIAL & METHODS**

**A. Study Setting:** This study was conducted in inpatients care units of The Main University Hospital {23 medical and surgical units and 8 intensive Care Units (ICUs)}.

**B. Study design:** Across sectional descriptive study

**C- Study Population:** The target populations included all available nursing personnel working in inpatient care units of The Main University Hospital.

**D- Sampling Design:** -

**Sample size:** - 530 nurses out a total of 729 worked in 23 medical and surgical wards and 8 intensive care units who willing to participate in the study.

**E- Data Collection**

51 items of questionnaire were used to describe nurses' perception regarding barriers that hinder managing and improving quality in nursing service. This questionnaire was developed by researcher and based on an extensive literature review of quality management surveys. (5, 7, 13-21)

### **Face and content Validity**

A panel of 5 experts examined the questionnaire for face and content validity. 2 experts had at least 5 years of experience in quality committee of Alexandria University Hospitals and had a diploma in total quality management and quality system from the Institute of Quality Management of the American University, and 3 nurses had a master's degree in health care quality management. For content validity, the experts evaluated the relevance items by using a scale ranging from 1 to 3, where, 1= not appropriate, 2= appropriate but not necessary, 3=absolutely appropriate. Experts were also asked if other relevant items should be added to the scale. The remarks of the panel were collected, categorized, discussed and revised in the scale accordingly.

**Inter-rater reliability:** Inter-rater reliability was assessed using Kendall's test for examining the degree of agreement between 5 experts on barriers questionnaire

### **Development of questionnaire**

This questionnaire was translated into Arabic and back translated into English. The approval of the final version of the scale was assured regarding its content and clarity. The questionnaire consisted of 2 parts namely; demographic data and barriers parts contain 51 statements. The nurses are required to choose the most appropriate answer by using 5 –point Likert style scale, ranging from strongly disagree to strongly agree with each statement (strongly disagree=1;strongly agree =5).

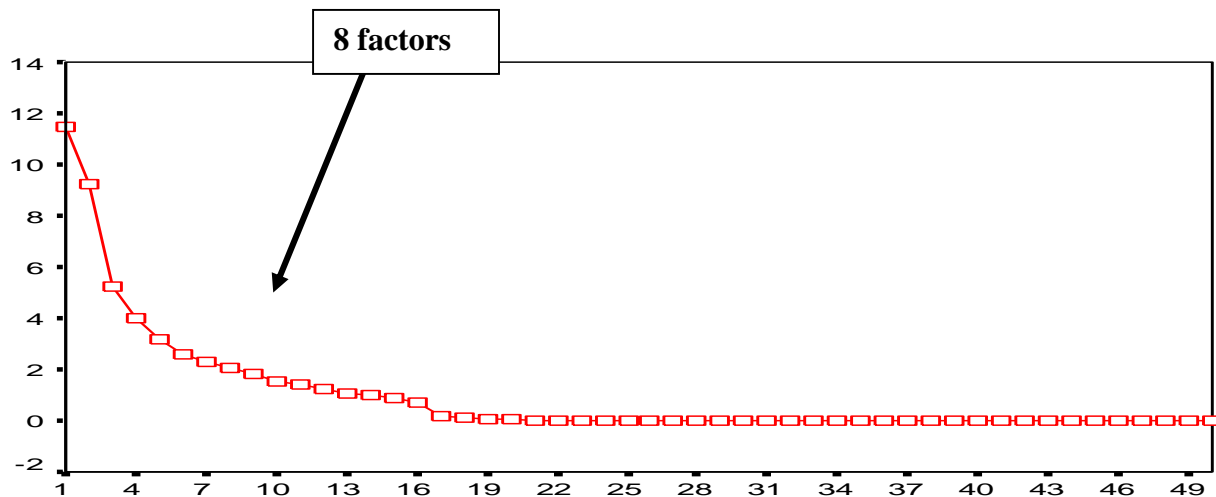
### **Test – retest reliability**

A pilot study was carried out on 50 nurses. They completed the same questionnaire at two different times (Approximately 3 weeks later between two times). The correlation (Pearson's r) of scores from time 1 and time 2 were used to assess test-retested reliability.

### **Construct validity**

A total of 729 questionnaires copies were distributed to nurses working in these units, 550 copies were returned (236 copies were returned from intensive care units and 314 copies were returned from medical and surgical wards), of which 530 copies were suitable for data analysis, giving a response rate 75.4 %. The questionnaire copy was accompanied by a formal letter providing explanations about a research being conducted and providing some contact details in case of any inquiries or clarification.

The construct validity was undertaken through factor analysis The Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity for each factor was measured. Moreover, Factors having Eigen value greater than one were retained. The result of the analysis was a rotated component matrix consisting of thirteen components that account for 94.18 % of the variance. The breaking point of the scree-plot indicated that the curve begins to flatten (tail) from factors 8 and extraction of 8 factors would account for 79.87 % of the variance. Therefore, factor analysis was carried out another time, choosing for the extraction of only 8 factors. Rules for determining how many factors should be retained are 1) retain only those factors with an Eigen value larger than 1; 2) keep the factors which, in total, account for about 70-80% of the variance; and3) Make a scree-plot; keep all factors before the breaking point or elbow.<sup>(22,23)</sup>



**Figure 1: Scree-plot**

51 questionnaire items were subjected to an exploratory factor analysis (EFA) based on the principal component analysis (PCA) with varimax rotation. Inspection of the varimax rotation matrix reveals 42 items were interrelated correlated and items with loadings less than 0.5 were not taken into analysis. Items with higher loadings were considered to be important and to have influence on the label selected to represent a factor. This factor structure with 42 items classifying into eight factors was stable and considered as the final factor solution.

### **Internal consistency Reliability**

Internal consistency reliability was established through calculating Cronbach's alpha coefficient for the questionnaire scale and sub- scale.

### **Statistical analysis:**

Data entry and processing were performed using the Statistical Package of the Social Science (SPSS) Software, version 15.0. Study sample was illustrated by using descriptive tables. Construct validity was assessed by factor analysis (FA) and principal component analysis (PCA) with varimax rotation. The Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity for all items and each factor was performed. Reliability of questionnaire tool was estimated by 1) Cronbach's alpha coefficient for the internal consistency reliability; 2) Kendall's test for inter rater reliability; and 3) Pearson's correlation coefficient for test –retest reliability.

## **RESULTS**

**Table 1** illustrates personal characteristics of nursing staff of inpatient care units of the Main University Hospital during the study period. It is clear from the table that 57.4 % of nurses work in surgical care units, while 42.6 % of them work in intensive care units. As regards the educational level , the majority of nurses (72.3 %) had a diploma of secondary technical nursing school, while 18.1 % of them had a bachelor degree of nursing science about thirty seven (37.5)% of nurses were in age group ranging 30-39 years old, while 13.1 % of them were over 50 years old.

Moreover, the half of the nurses (50.4 %) had over ten years of experience in hospital, 33.2 % of nurses had between 5 and 9 years of experience and 16.4 % had less than 5 years of experience. Regarding quality training, 82.3 % of nurses did not receive quality training while 17.7 % received quality training.

**Table 2** reveals reliability tests for barriers questionnaire. It is clear from the table that inter-rater reliability was achieved by using Kendall's test which resulted in a coefficient  $r = 0.76$  while test-retest reliability was obtained by Pearson's correlation coefficient. The correlation between test and the retest was 0.79.

**Table 3** represents the rotation solution showed 42 items loadings on the eight components was stable and considered as the final factor solution.

**Table 4** shows construct validity of barriers questionnaire by Principal Component Analysis. There are eight components were retained. The eight factors solution explained a total of 79.872 % of the variance. The KMO values for all components ranged from .500 to .723 with statistical significant of Bartlett's Test of Sphericity ( $p = 0.000$ ). Concerning KMO value for all items was .720 with statistical significant of Bartlett's Test of Sphericity ( $p = 0.000$ )

**Table 5** shows the reliability analysis of the eight components of the barriers questionnaire. The component mean and standard deviation ranged between the highest for customer focus barriers  $3.72 \pm 0.79$  and lowest for cultural barriers  $3.49 \pm 0.88$ . As regards the internal consistency reliability, the alpha if item deleted ranged between 0.74 and 0.81 in relations to the total alpha score for the item (0.82).

**Table 1: Personal characteristics of nursing staff of inpatient care units of the Main University Hospital during the study period**

Personal characteristics	Nurses who participated in study N=530	
	No.	%
<b><u>In patient care units</u></b>		
Medical & Surgical wards	304	57.4
Intensive Care Units	226	42.6
<b><u>Educational Qualification</u></b>		
Bachelor of Nursing Science	96	18.1
Diploma of Technical Health Institute	51	9.6
Diploma of Secondary Technical Nursing School	383	72.3
<b><u>Age (years)</u></b>		
< 30	149	28.1
30-39	199	37.5
40-49	113	21.3
>50	69	13.1
<b><u>Years of Experience (years)</u></b>		
< 5	87	16.4
5 – 9	176	33.2
10+	267	50.4
<b><u>Quality training</u></b>		
Receiving quality training	94	17.7
Not receiving quality training	436	82.3

**Table 2: Reliability tests for barriers questionnaire**

Reliability tests	Coefficient (r)
<b>Inter-rater reliability:</b> Kendall's test	<b>0.85</b>
<b>Test – retest reliability :</b> Pearson's correlation coefficient	<b>0.79</b>

**Table 3: Factor Analysis with Varimax Rotation Component Matrix**

Barriers to managing and improving quality in nursing service	Components							
	1	2	3	4	5	6	7	8
(6)There are inadequate resources to effectively employ total quality management	.670							
(7) Cross-functional teams are not employed	.850							
(8)Time constraints prohibit effective total quality management implementation	.813							
(14)Tendency to adopt latest technology without checking on the reliability and the need for it.	.841							
(28)Management's compensation is not linked to achieving quality goals	.599							
(1) Strategic plans do not include quality goals		.850						
(2) Quality is treated as a separate initiative		.885						
(3) Quality is not everyone's responsibility		.546						
(4) Quality action plans are often vague		.599						
(18)Lack of formalized strategic plan for change		.670						
(19)View of quality program as quick fix		.807						
(26)Top management is not visibly and explicitly committed to quality			.723					
(27)There are excess layers of management			.885					
(29)There is frequent turnover of management			.807					
(30)Management decisions are always short term oriented			.546					
(31)Nursing managers think that problem is something to avoid			.754					
(32)Failure of nursing manager to consider the influence factors such as fatigue , distraction , time pressure , nursing shortage , workload			.739					
(33)Lack of good supervision			.899					
(34)Nursing manager is not closely involved in quality management activities			.756					
(35)Nursing manager attention is not paid to motivating nurses to participate in quality activities			.516					
(51)Inability or unwillingness of management to deal with nurses' resistance to change			.914					
(36)Lack of commitment from nurses				.850				
(37)Nurses are not trained in problem identification and problem-solving techniques.				.813				
(38)Nurses are not trained in group discussion and communication techniques				.670				
(39)Nurses are not empowered to implement quality improvement efforts				.536				

(40)Nurses and teams are (not) recognized for achievements in quality improvement				.546				
(41)Nurses are not trained in quality improvement skills.				.841				
(42)Nurses are resistant to change.				.807				
(43)There is frequent turnover of nurses				.756				
(45)General Lack of understanding /awareness of TQM				.883				
(47)Low adoption of quality standard				.914				
(48)Nurse was not adequately involved / engaged in the quality program				.899				
(49)Absence of knowledge about philosophy of nursing care service				.885				
(5)The strategic plan is not customer driven					.813			
(9)Quality is not defined by the customer					.914			
(10)The best nursing practices and/or nursing care service of other hospital are not benchmarked.						.883		
(11)Quality is not effectively measured						.723		
(12)Quality improvement efforts rarely meet expectations in terms of desired results							.739	
(13)The high costs of implementing total quality management outweigh the benefits							.899	
(15)Lack of address quality in nursing performance appraisal							.754	
(16)Failure / inability to change organizational culture								.841
(22)No adoption of non -punitive culture change								.883

**Note: Factor loading > 0.50-Eigen value > 1.**

**Table 4: Construct validity of barriers questionnaire by Principal Component Analysis.**

Component	Eigen values			KMO	Bartlett Test of Sprericity	KMO value (Bartlett Test of Sprericity) for all items
	Total	% of Variance	Cumulative %			
1. Managerial barriers	11.450	22.901	22.901	.705	.000	<b>.720 (.000)</b>
2. Planning barriers	8.700	17.400	40.301	.723	.000	
3. Nursing leadership barriers	5.587	11.173	51.475	.685	.000	
4. Nursing personnel barriers	3.986	7.973	59.448	.666	.000	
5.Customer focus barriers	3.163	6.326	65.774	.643	.000	
6. Information management barriers	2.516	5.032	70.806	.500	.000	
7. Organizational barriers	2.420	4.841	75.647	.545	.000	
8. Cultural barriers	2.113	4.225	79.872	.500	.000	

**Table 5: Total reliability analysis of barriers questionnaire.**

Component	Mean ± S.D.	Corrected item-total correlation	Alpha if item deleted
1. Managerial barriers	3.60±.73	.53	.78
2. Planning barriers	3.53±.71	.60	.77
3. Nursing leadership barriers	3.60±.58	.63	.77
4. Nursing personnel barriers	3.62±.52	.91	.74
5. Customer focus barriers	3.72±.79	.41	.80
6. Information management barriers	3.58±.84	.51	.78
7. Organizational barriers	3.66±.79	.48	.81
8. Cultural barriers	3.49±.88	.49	.79

Alpha = 0.82

## DISCUSSION

Although, Florence Nightingale introduced the concept of quality in nursing care in 1855, implementation of quality in nursing service facing many barriers.<sup>(17)</sup> It is important for nursing managers and nursing staff to understand those barriers before total quality management has been implemented and try to avoid those barriers during implementation of TQM process. Therefore, the aim of this study was to develop a valid and reliable Egyptian instrument for identifying barriers influencing managing and improving quality in nursing service from nurses' perspective views. Validity of instrument means that extent to which a variable or intervention measures what it is supposed to measure or accomplishes.<sup>(24)</sup> Assessing validity can be performed by face and content validity and construct validity. Face and content validity was previously explained in methodology while construct validity can be undertaken by factor analysis.<sup>(25)</sup> According to Kerlinger (1994) factor analysis is "powerful and indispensable method of construct validation".<sup>(26)</sup>

An adequate sample size is important for identifying the correct factor analysis. Sample size can be lead to generalize the results of analysis; and seriously influenced the reliability and construct validity of factor analysis.<sup>(25)</sup> A sample size of less than 100 is not very suitable for conducting factor analysis. A sample size above 500 is considered to be excellent. As a rule of thumb, a sample size of 200–300 should be considered to be adequate for a proper analysis.<sup>(24)</sup> The present study revealed that sample size was 530 nurses who working in different medical and surgical wards as well as in different intensive care units of the Main University Hospital ( **Table 1** ). The sample under study giving an indication that this instrument could be generalized on other Egyptian health care organizations for identifying and investigating barriers that hinder managing and improving quality in nursing service from the nurses' point of views .

This indication may be also attributed to the fact that the Kaiser-Meyer-Olkin (KMO) values for all items was .720 with statistically significantly of Bartlett's test of sphericity (**Table 4**). Kaiser (1974)<sup>(27)</sup> has published that KMO between 0.5 and 0.7 are mediocre, value between 0.7 and 0.8



are good, value between 0.8 and 0.9 are great and value above 0.9 are excellent". Moreover, the number of researchers as Kaiser (1974)<sup>(27)</sup>, Norusis (1994)<sup>(28)</sup> and Gaur *et al* (2004)<sup>(29)</sup> have pointed that "the value of Kaiser-Meyer-Olkin (KMO) below 0.5 indicated this value unacceptable and the high KMO measures allows more meaningful analysis to be obtained, this can be confirmed by Bartlett's Test of Sphericity was significant ( $p < 0.0005$ ).” However KMO value for each factor is satisfactory (ranged from 0.500 to 0.723) with statistically significantly of Bartlett's test of sphericity (**Table 4**), it indicates presence of a statistically acceptable factor analysis that representing relations between the questionnaire items.

Factor analysis (FA) and Principal Components Analysis (PCA) are techniques used when the researcher is interested in identifying a smaller number of factors underlying a large number of observed variables.<sup>(25, 22, 30)</sup> Chatfield and Collin, (1992) define the factor analysis (FA) is a "data reduction" techniques that uses the correlation between data variables or FA is that a number of factors exist to explaining the correlation or inter relationships between observed variables.<sup>(31)</sup> According to Torbica in 1999, "PCA used to produce a structure matrix of variables after rotation where the number of component determined was based on the criterion that the Eigen value for each component must be more than one."<sup>(32)</sup> An Eigen value of less than one essentially means that the factor explains less variance than a single variable, and therefore should not be considered to be a meaningful.<sup>(25, 27, 33)</sup> The present study found that Eigen value was more than one with deriving forty two questionnaire items out of 51 questionnaire items . Forty two variables with similar characteristics have a high correlation between them and are combined together into eight components (**Table 3**). The eight principle components accounted for 79.87% of variance; thus eight principle components are considered as meaningful factors (**Table 4**). It is proven from the results of present study that Egyptian questionnaire instrument is considered a valid instrument for measuring nurses' perception of barriers influencing managing and improving quality in Egyptian nursing service.

The researcher appropriately named eight factors which crucial and essential for achieving successful TQM implementation in nursing service as the following (**Table 3 and 4**). : **Factor-1 "managerial"**, involving items about management's compensation, time constraints, inadequate resources, adopt latest technology, cross function team; **Factor - 2 "planning"** including items about : strategic plan for change, quality goal in strategic planning , quality planning, treated quality plan, quality program, responsibility of every one in quality; **Factor -3 "nursing leadership"** comprising the following items : layers management, turnover of management, management decision, dealing of management with nurses' resistance , commitment of top management, involved of nursing manager, thinking of manager towards problem, considers influence factors such as fatigue ...etc, supervision , paid attention to motivation ; **Factor – 4 "nursing personnel"** involving the following items turnover of nurses , involved of nurses in quality program , commitment of nurses, nurses are not trained in problem solving , discussion and communication and quality improvement skill , awareness of TQM , absence of knowledge regarding philosophy , nurses' resistance to change, empowered of nurses, nursing teams are not recognized, low adoption of quality standards; **Factor - 5 "customers focus"** including items about define customer and customer driven. **Factor -6 "information management"** involving items about absence of nursing benchmarked, effective quality measure respectively; **Factor 7 "organizational"** involving items about address quality in nursing performance appraisal ,

quality improvement effort , costs of implementing TQM; and **Factor -8 “cultural “**involving items about change organizational cultural and adopt non –punitive culture.

The current study found that the interpretation of the eight factors is consistent with comprehensive researches that focusing barriers of TQM implementation in health sector. <sup>(15,16,34-37)</sup> The previous researches identified five to nine major barriers which might be incurred implementing TQM in health care sector namely : leadership / top management commitment and style ; planning ( strategic and quality ); customer focus ; employee focus ( participation and involvement ) ; culture ( organizational and quality ); information management ; organizational structure ; inadequate resources for TQM( human and non human ) and lack of understanding of TQM. <sup>(15, 16, 34-37)</sup>

Concerning reliability of questionnaire instrument, inters –rater reliability and test – retest reliability of questionnaire instrument were estimated. It is evident from the present study that there was satisfactory agreement between 5 experts on Egyptian questionnaire instrument (Kendall’s coefficient was 0.76) and stability of this instrument over time (Pearson's correlation coefficient between test and the retest was 0.79) (**Table 2**). In addition, some of the commonly used techniques for assessing reliability include Cronbach’s alpha for internal reliability of a set of questions (scales). The present study indicated that the Cronbach’s alpha for eight constructs ranged from 0.74 to 0.81, this indicated the satisfactory reliability of the instrument (**Table 5**). Polit and Devbellis have argued that reliability coefficient between 0.6 to 0.7 would probably be sufficient (acceptable), higher than 0.70 are often considered satisfactory, but coefficient greater than 0.80 are far preferable” <sup>(24, 38)</sup> Where the overall Cronbach’s alpha 0.82 confirm that Egyptian instrument is highly reliable for completely measuring nurses’ perception on barriers influencing managing and improving quality in Egyptian nursing service.

## CONCLUSION

The researcher developed a valid and reliable Egyptian instrument for measuring nurses’ perception on factors influencing managing and improving quality in nursing services. The Egyptian instrument consists of forty two barriers and eight main obstacles involving: managerial; planning; nursing leadership; nursing personnel; customer focus; information management; organizational and cultural barriers. This instrument could be only generalized in nursing service of Egyptian health care organizations for helping Egyptian researchers, health care policy makers, health care practitioners, nursing managers and nursing staff to managing and improving quality of care in nursing service.

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