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Derleme / Review Article

Developing a valid and reliable questionnaire for healthcare quality research

Sağlık hizmetlerinin kalitesinde geçerli ve güvenilir soru formu geliştirme yöntemleri

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ABSTRACT

Quantitative research methodology focuses on objective interpretation and has a prediction element based on the data provided.To be able to conduct a quantitative type of study, a data collection tool should be designed. This paper overviews a practical and methodological example of designing a valid and reliable data collection instrument for purposes of quantitative studies in healthcare quality research.

ÖZET

Kantitatif araştırma yöntemi, objektif değerlendirmeye odaklıdır ve en önemli öngörüsü sunulan dataya dayalıdır. Kantitatif tipte bir araştırma gerçekleştirebilmek için etkin bir veri toplama aracı geliştirilmesi zorunludur. Bu makalede, sağlıkta kalitede kantitatif bir araştırma gerçekleştirebilmek için gerekli olan veriyi toplamada geçerli ve güvenilir bir anket formu geliştirme yöntemleri örneklerle açıklanacaktır.

INTRODUCTION

Qualitative, quantitative, and mixed approaches the three common methods used in research inquiries[1] .The qualitative approach is a detail script oriented and narration wealthy, focusing on subjective interpretation and exploration, which are the main themes of these types of studies. However, the quantitative methods in contrast are much more objective measurements. The quantitative research methodology focuses on objective interpretation and has a prediction element based on the data provided. The mixed approach as indicated is a mixture of both quantitative and qualitative studies[2]. To be able to conduct a quantitative type of study, a data collection tool should be designed. This paper overviews a practical example of designing a data collection instrument for purposes of quantitative studies.

INSTRUMENTATION

A structured questionnaire was developed against a set of criteria based on the Institute of Medicine's(IOM) Crossing the Quality Chasm report, as shown in the appendix. This study outlined the six dimensions of quality to be: Safety, Timeliness, Efficiency, Effectiveness, Equity, and Patient Centeredness[3].

The objective of this questionnaire was to

Identify the most important four indicators under the six main IOM quality dimensions of Safety, timeliness,

efficiency, effectiveness, equity, and patient centeredness, according to experts in the field of healthcare quality.

To collect data that will help the researcher to quantify improvement of quality in hospitals after accreditation and compare it to levels of compliance before accreditation.

The instrument based its theme on the report that outlined the dimensions of quality in the healthcare industry. The questionnaire and data collection instrument contained the exact six domains outlined by the Institute of Medicine known as STEEEP. There were four questions under each of the six STEEEP domains or dimensions; each of these inquiries was based on Joint Commission International (JCI) standards and quality principles[4]. The questionnaire measured the performance improvement in each hospital from before getting JCI accreditation to after a year of full accreditation from an internal stakeholder's perspective. The internal stakeholder was the quality management director or the director of the accreditation department. The 24 questions were presented to the respondents with pre-coded options measured on a Likert ordinal scale of 1-5. This Likert scale format in which respondents are asked to rank was as following:

1= Not available or (Poor)

2= Only documented but not used at all. Or (Fair)

3= Documented and used sometimes. Or (Average)

4= Documented and used more often. Or (Very Good)

5= Documented and used always. Or (Excellent)

This ordinal scaling enabled the respondent to collect and fill the survey easily. The Likert scale also advantaged this study by permitting more than the average number of questions and to enable the researcher to collect more data and facilitating an easier data analysis.

In addition, all the questions used for the completion of the surveyare closed ended. These closed-ended questions have definite answers that will be easier to process and understand which will provide greater uniformity.

THE QUESTIONNAIRE DESIGN JOURNEY:

A) Forming the questionnaire and choosing the questions

"The question is half of the answer", is a meaningful Arabic idiom. For the researcher to obtain correct answers, he or she must ask the proper clear questions. In a field where measurement is essential and based on proper data obtained, the acquisition of data through well written and designed questionnaires is extremely important in order to get to the correct information.

The theme of the questionnaire is based on the IOM's Crossing the Quality Chasm, which will be discussed in detail in the following section. However the content of the questions is based on the most frequent issues and topics discussed and events that happen and occur in hospitals today in relation to the field of healthcare quality and patient safety. Accrediting bodies strive to reduce these problems in hospitals to be better curing environments. As an example the researcher used the rate of occurrence of medication errors, wrong site surgery, and patient falls in hospitals under the safety domain questions. These three were defined by the Joint Commission to be of the leading top five types of sentinel and adverse events that happen at U.S. hospitals[5]. On the same token questions were chosen under the remaining domains accordingly.

B) Questions Validation

Validity is described as the level in which an instrument measures what it is supposed to be measuring[6]. Developing 24 questions to be a quality and comparison measurement instrument is a tedious task; however, validating those inquiries is a very challenging and a time-consuming step the researcher had to face. According to McLaughlin and Kaluzny6 any measurement tool or device should be checked against any of the three following types of validity, but for the purposes of this study the researcher managed to use the latter two which are outlined as following:

The first type of validity is termed as the criterion validity, which compares and examines the consistency of a developed questionnaire to the golden standard and is called the content validity.

The second type of validity pertains to how adequate the measurement tool consists of substantive rational content, which is in direct relation to the aspects and the concept it is designed to measure. Content validity is the measurement tool assessment by knowledgeable and experienced people in the field of study. These experts could be clients or patients, physicians, caregivers, and/or researchers. This initial constructing phase of appropriateness testing and review of the content is referred to as face validity[7].

The questionnaire, which is the instrument to measure the impact of JCI accreditation, fulfilled the content validity by face validation. To ascertain this type of validity, the questions developed in this instrument were initially developed and amended by a panel of experts. This team included quality or accreditation directors at six Joint Commission accredited hospitals in the Oklahoma City metro, and were as following:

1. Integris Baptist Hospital and Medical Center, Northwest Expressway branch.
2. The Veterans Affairs (VA) Hospital.

3. Mercy Hospital, West Memorial road branch.
4. Edmond Medical Center
5. OU Medical Center, Northeast 13th street branch
6. The Oklahoma Heart Hospital

The questions were scrutinized and changed accordingly to ascertain their validity. Moreover, the expert panel team also included professors from the University of Oklahoma Health Sciences Center, and faculty at the College of Public Health, and the Health Administration and Policy department, which were part of the advising committee that supervised this study. This committee also revised the questions as they have changed, and a consensus was reached from both teams.

The third category of validity is the measurement of how well the tool measures an abstract concept and how well it relates to the topic in research and is referred to as the construct validity. This type of validity measures the underlying construct and theme.

In this study the data collection instrument achieved the construct validity, where the main theme and major categories were based on the IOM's Crossing the Quality Chasm report, a scholarly publication that outlined the main important elements that defines quality healthcare and are indicators of successful quality implementation if achieved.

Following the Institute of Medicine's (IOM) report in 1999 titled To Err is Human; the IOM released a related report in 2001titled Crossing the Quality Chasm. The report urged health professionals, purchasers, healthcare providers, consumers, and management, to commit to quality.In addition quality healthcare services should be based on the following six dimensions with the acronym (STEEEP):

- Safety: to avoid injury and harm to a patient when care is the main intention.
- Timeliness: by reducing all kinds of waiting times that could be harmful due to belated care.
- Effectiveness: being effective in healthcare is to do the right thing by performing the intended accurate and correct diagnosis, procedures, and therapies.
- Efficiency: being efficient is by using healthcare scarce resources properly by avoiding wasteful usage.
- Equitability: by providing equal care to all patients without variation due to personal race, creed, ethnic background, sex, and or socioeconomic status.
- Patient centeredness: giving the patient and his/her family the upper hand in their treatment choices and preferences in addition to being respectful and responsive to patient's preferences. Patient centeredness also includes the understanding of patients and families decisions that are made according to their specific needs, and values[8].

These six dimensions of safety, timeliness, efficiency, effectiveness, equity, and patient centeredness are the most comprehensive healthcare quality defined dimensions to date, thus they were used as the underlined and main big picture theme the questionnaire was built upon.

C) Reliability of a questionnaire:

The creation of valid and reliable tests in public health and medical research is extremely important. They both are fundamental elements that evaluate a measurement tool such as a survey or a questionnaire. As discussed earlier an instrument is considered to be valid when it measures what is intended, however it is considered to be reliable when its measurements are consistent. The measurement of the reliability of a questionnaire is possible with a statistical method called the Cronbach's alpha test. It provides a measurement of internal consistency and is expressed as a number between zero to one. The closer alpha's value to 1 the higher the reliability of the data collection instrument[9].

The Cronbach alpha for this set of 24 questions was calculated with SPSS 17 software package, after collecting all the data from the respondents. The alpha values for the pre and post accreditation were calculated separately. The Cronbach's alpha values for the pre and post accreditation of 65 responds are 0.885 and 0.876 respectively. The average Cronbach alpha value for both pre and post responds is 0.8805. The results reflect and prove that the data collection tool is highly reliable. With the rule stating that a reliable tool is definitely a valid tool[9], the Cronbach alpha values authenticate that the questionnaire used to collect data in this project are both reliable and valid.

D) Data Collection and response rate:

The expert panel that reviewed and validated the questionnaire revealed that the best methodology to collect the data in this specific case was to leave the questionnaire with the respondent, which is known as "self-administered" versus an interview method. In addition, to reduce response rate attrition, the consulting panel advised avoiding phone interviews as well as mailing in the survey via any postal service. The researcher visited the Arabian Gulf Cooperation Countries (GCC) that houses more than 25% of theworldwide JCI-accredited hospitals. A hard copy of the survey tool was handed in person to the quality department's head or officer in charge, as well as a signed attestation privacy consent form, to all of the 73 GCC, JCI accredited hospitals. A brief meeting was conducted at each hospital's visit.

Table 1. Number of GCC hospitals that responded and the percentage of responding hospitals.

Country	Number of JCI-accredited hospitals	Number of hospitals that replied	Response rate
Saudi Arabia	34	31	91.17%
United Arab Emirates	32	27	84.375
Qatar	5	5	100%
State of Kuwait	2	2	100%
Total	73	65	89.04%

During the in-person meeting and handing the hard copy, the researcher introduced and explained the objectives, the main theme, and covered the survey questions of the study. The researcher made sure the respondent understood by giving them the opportunity for further inquiries. The quality manager, director, or administrator filling out the questionnaire provided the researcher with his/her business card containing the electronic mail (e-mail) address, and telephone or mobile number. The researcher then sent a soft copy of the questionnaire immediately after the meeting to the respondent by email. In most cases the researcher had to follow up at later times via telephone to make sure the respondent had already or would send the answers.

Questionnaires were distributed as mentioned earlier to 73 hospitals in the GCC that were accredited by the JCI by March of 2011[10]. The hospital's quality department was required to send back one filled questionnaire. The representative of each hospital was either the quality management director or the accreditation officer in charge at the facility. The total number of hospitals that responded were 65 hospitals out of 73. The overall response rate was 89.04%. The number of hospitals that replied in each country is represented in table 1.

E) Limitations

The researcher faced several limitations. The researcher had to plan ahead and have solutions to be able to overcome them. The limitations are summarized as:

1) Inter-rater bias:

Any questionnaire with a Likert scale could face an inter-rater bias, which is the degree of agreement among those filling out the questionnaire/survey[11].

2) Duration of the study:

The investigation was limited to the timing of after hospitals have been accredited, which restricted adequate time to capture all the effects of JCI accreditation over the different times of before, during, and after accreditation. In addition to the time constraint and funding limitations which leads us to the following limitation.

3) Geographic Narrowness :

The study was geographically narrow in scope. The covered region as a whole has the most number of JCI-accredited hospitals. The study could have been generalized to all the accredited hospitals in the world.

4) Full coverage of the Joint Commission International Standards:

The research design and method employed surveys and polls to measure perceived performance improvement. The questionnaires were based on the IOM's defined dimensions of quality in the healthcare sector published in the report Crossing the Quality Chasm (STEEEP). However, the survey did not address all standards of the JCI, as the questionnaire only covers a total of twenty four different areas, four under each IOM dimension, which is a limited number of JCI standards that were tested, which could affect the content validity of this investigation.

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Pre and Post Hospital Accreditation Evaluation Survey

Please answer the following questions.
Ranking from 1-5
1= Not available or (Poor)
2= only documented, but not used at all. Or (Fair)
3= Documented, and used sometimes. Or (Average)
4= Documented, and used more often. Or (Very Good)
5= Documented, and used always. Or (Excellent)

Thank you for your time and valuable insight.

1) Safety

	Questions	Notes
1. P	A) What was the rate of incident reports and willingness to report *before* accreditation? B) What is the rate of incident reports and willingness to report *after* accreditation?	A)1 2 3 4 5 Poor Excellent B)1 2 3 4 5 Poor Excellent
2. O	A) How would you rate on a scale of 1-5 the occurrence of medication errors *before* accreditation? B) How would you rate on a scale of 1-5 the occurrence of medication errors *after* accreditation?	A)1 2 3 4 5 High Low B)1 2 3 4 5 High Low
3 . O	A) How would you rate on a scale of 1-5 the occurrence of wrong site surgery *before* accreditation? B) How would you rate on a scale of 1-5 the occurrence of wrong site surgery *after* accreditation?	A)1 2 3 4 5 High Low B)1 2 3 4 5 High Low
4. O	A) How do you rate on a scale of 1-5 the occurrence of patient falls at your hospital *before* accreditation? B) How do you rate on a scale of 1-5 the occurrence of patient falls at your hospital *after* accreditation?	A)1 2 3 4 5 High Low B)1 2 3 4 5 High Low

2) Timeliness

1= Not available or (Poor).
2= only documented, but not used at all. Or (Fair)
3= Documented, and used sometimes. Or (Average)
4= Documented, and used more often. Or (Very Good)
5= Documented, and used always. Or (Excellent)

	Questions	Notes
1. P	A) Was patient satisfaction data used to address issues related to timeliness *before* accreditation? B) Was patient satisfaction data used to address issues related to timeliness *after* accreditation?	A)1 2 3 4 5 Low High B)1 2 3 4 5 Low High
2 P.	A) Rate hospital's ER investigation of factors that contribute to delays *before* accreditation? B) Rate hospital investigation of factors that contribute to delay *after*accreditation?	A)1 2 3 4 5 Low High B)1 2 3 4 5 Low High
3. O	A) Rate the timeliness of Operating Room start at your hospital *before* accreditation. B1) Rate the timeliness of Operating Room start at your hospital *after* accreditation.	A)1 2 3 4 5 Poor Excellent B)1 2 3 4 5 Poor Excellent
4. O	A) Rate the **average** waiting time for patients at the Emergency Room (ER) (from arrival time to inpatient admission) **one year***before* accreditation (in minutes)? B) Rate the **average** waiting time for patients at the Emergency Room (ER) (from arrival time to inpatient admission) **one year***after* accreditation (in minutes)?	A)1 2 3 4 5 Long Short B)1 2 3 4 5 Long Short

3) Efficiency

Ranking from 1-5
1= Not available or (Poor)
2= only documented, but not used at all. Or (Fair)
3= Documented, and used sometimes. Or (Average)
4= Documented, and used more often. Or (Very Good)
5= Documented, and used always. Or (Excellent)

	Questions	Notes
1.	A) Rate on a scale from 1-5 if inpatient continued stay standards based on utilization management criterion was used at the hospital, *before* accreditation?	A)12 3 4 5 Low High
P	B) Rate on a scale from 1-5 if inpatient continued stay standards based on utilization management criterion was used at the hospital, *after* accreditation.	B)1 2 3 4 5 Low High
2.	A) Rate on a scale from 1-5 if an inpatient admission criterion was used at the hospital, *before* accreditation?	A)1 2 3 4 5 Low High
P	B) Rate on a scale from 1-5 if an inpatient admission criterion was used at the hospital, *after* accreditation?	B)1 2 3 4 5 Low High
3.*	A) What was the average length of stay at the hospital one year before accreditation?	A)
O	B) What is the average length of stay at the hospital after accreditation?	B)
4.*	A) What was the annual inpatient census, one year *before* accreditation?	A)
O	B) What was the annual inpatient census, one year *after* accreditation?	B)

*Average Length of Stay= sum of the days stay of any group of inpatients discharged during a specific period of time
Total number of discharges

*Annual inpatient days= Total number of patients treated during that period

4) Effectiveness

Ranking from 1-5
1= Not available or (Poor)
2= only documented, but not used at all. Or (Fair)
3= Documented, and used sometimes. Or (Average)
4= Documented, and used more often. Or (Very Good)
5= Documented, and used always. Or (Excellent)

	Questions	Notes
1.	A) How do you rate the hospital maintaining proper credentialing and privileging *before* accreditation on a scale from 1-5?	A)1 2 3 4 5 Poor Excellent
P	B) How do you rate the hospital's maintaining proper credentialing and privileging and privileging *after* accreditation on a scale from 1-5?	B)1 2 3 4 5 Poor Excellent
2.	A) What was the average Patient satisfaction scores at the hospital *before* accreditation?	A)1 2 3 4 5 Poor Excellent
O	B) What is the average Patient satisfaction scores at the hospital *after* accreditation?	B)1 2 3 4 5 Poor Excellent
3.	A) What was the average Employee satisfaction score at the hospital *before* accreditation?	A)1 2 3 4 5 Poor Excellent
O	B) What is the Employee satisfaction score at the hospital *after* accreditation?	B)1 2 3 4 5 Poor Excellent
4.*	A) What was the Gross Hospital Death rate at the hospital one year *before* accreditation?	A)
O	B) What is the Gross Hospital Death rate at the hospital *after* accreditation?	B)

*Gross hospital death rate= Total number of inpatient deaths (including newborns) x 100
Total Number of discharges (including deaths and newborns)

5) Equity

Ranking from 1-5
1= Not available or (Poor)
2= only documented, but not used at all. Or (Fair)
3= Documented, and used sometimes. Or (Average)
4= Documented, and used more often. Or (Very Good)
5= Documented, and used always. Or (Excellent)

	Questions	Notes
1.	A) Rate on a scale from 1-5, how well patients were informed about their treatment plan at the hospital *before* accreditation?	A)1 2 3 4 5 Poor Excellent
P	B) Rate on a scale from 1-5, how well patients are informed about their treatment plan *after* accreditation?	B)1 2 3 4 5 Poor Excellent
2.	A) Rate how well patients were assessed for their ability to learn at the hospital *before* accreditation on a scale from 1-5?	A)1 2 3 4 5 Poor Excellent
P	B) Rate how well patients were assessed for their ability to learn at the hospital *after* accreditation on a scale from 1-5?	B)1 2 3 4 5 Poor Excellent
3.	A) How do you rate the hospital's performance in relation to providing equal opportunity for education for all patients at the hospital *before* accreditation on a scale form 1-5?	A)1 2 3 4 5 Poor Excellent
P	B) How do you rate the hospital's performance in relation to providing equal opportunity for education for all patients at the hospital *after* accreditation on a scale form 1-5?	B)1 2 3 4 5 Poor Excellent
4.	A) Rate the hospital capturing standard set of demographics *before* accreditation on a scale from 1-5?	A)1 2 3 4 5 Poor Excellent
P	B) Rate the hospital capturing of demographics *after* accreditation on a scale from 1-5?	B)1 2 3 4 5 Poor Excellent

6) Patient Centeredness

Ranking from 1-5
1= Not available or (Poor)
2= only documented, but not used at all. Or (Fair)
3= Documented, and used sometimes. Or (Average)
4= Documented, and used more often. Or (Very Good)
5= Documented, and used always. Or (Excellent)

	Questions	Notes
1.	A) Rate the hospital's pain assessment and management program *before* accreditation on a scale from 1-5?	A)1 2 3 4 5 Poor Excellent
P	B) Rate the hospital's pain assessment and management program *after* accreditation on a scale from 1-5?	B)1 2 3 4 5 Poor Excellent
2.	A) Rate the hospital's patient fall risk assessment program *before* accreditation on a scale of 1-5?	A)1 2 3 4 5 Poor Excellent
P	B) Rate the hospital's patient fall risk assessment program *after* accreditation on a scale of 1-5?	B)1 2 3 4 5 Poor Excellent
3.	A) Rate the hospital's rapid response team program *before* accreditation on a scale of 1-5?	A)1 2 3 4 5 Poor Excellent
P	B) Rate the hospital's rapid response team program*after* accreditation on a scale of 1-5?	B)1 2 3 4 5 Poor Excellent
4.	A) Rate the lengthiness of the Hospitals inpatient visiting times and hours *before* accreditation on a scale of 1-5?	A)1 2 3 4 5 1= 0-1Hrs 2= 2Hrs 3=3 Hrs 4=4-6 Hrs 5= 7+ Hrs
P	B) Rate the lengthiness of the Hospitals inpatient visiting times and hours *after* accreditation on a scale of 1-5?	B) 1 2 3 4 5 1= 0-1Hrs 2= 2Hrs 3=3 Hrs 4=4-6 Hrs 5= 7+ Hrs