



## Original Research Article

# Reliability of the tool: Structured knowledge questionnaires on simulation in nursing education

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## ABSTRACT

**Background:** Nursing is a caring profession which needs skill to perform on human being. Any mistakes commits by nurses is legal issue. Nurses should develop a skills in there carer. The proper training for the student nurses is very much important to minimize the mistakes while at work. Simulation is one of the strategies of teaching in health sciences especially. Simulators provide an opportunity to commit a mistake on them and learn the correct procedures to perform on the patients. Knowledge of the students regarding simulation and different types of simulator and the significance of all types of simulator is paramount. The knowledge questionnaires are the one which measures the knowledge of particular aspects of an individual. It is mandatory to check the questionnaires whether it measures what it supposed to be measure. Reliability check is the procedure to measure the consistency of questionnaire.

**Objective:** This study aim to estimate the reliability of structured knowledge questionnaires regarding simulation in nursing education.

**Materials and Methods:** The tool so called structured knowledge questionnaire on simulation consists of 30 multiple choice questions. The internal consistency of the tool by split half method has been estimated (Total samples were 10 in number). Questionnaires have been divided in to two halves i.e. odd and even items and compare both halves by Pearson correlation coefficient formula.

**Results and Analysis:** The split half reliability of structured knowledge questionnaires found to be excellent i.e.  $r=0.80$ . This result depicted that the prepared knowledge questionnaires are reliable.

**Conclusion:** Any tool which is developed for the research should be check for its accuracy and reliability. Reliability is one of them where it measures the tool for its correctness and reliable for administration. In this study the researcher had computed the reliability and tool found to be an excellent. It is also recommended that the reliable tool should be pretesting.

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## 1. Introduction

In the health care setting equipment's changing continually. Nurses have a responsibility to update these changes and be competent and able in the use of such equipment. Nursing faculty play an important role to train the student nurses.<sup>1</sup>

Errors in the hospital and in all health care sectors are common such as medication error, procedure error,

invasive error, non-invasive error and also all types of skill oriented procedure errors. The common reason for nursing errors were lack of knowledge, inadequate or information, overload work, stressful environment and lack of support from others.<sup>2</sup>

Knowledge of the nursing students may enhance by innovative methods. Teaching nursing procedure by using simulator in nursing field is an effective method comparing to old clinical methods.<sup>3</sup> Hence the current study targeted at preparing a reliable tool to estimate the

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knowledge of nursing students regarding simulation in nursing education.<sup>4</sup>

Reliability is the overall consistency of a measure. A measure is said to have a high reliability if it produces similar results under consistent conditions.<sup>5</sup>

To evaluate the internal consistency the split-half method is used, especially questionnaires. It measures the extent to which all existed part of the questionnaires contribute equally to what is being measured.<sup>6</sup> The current study evaluate the reliability of the tool i.e. knowledge questionnaires.

## 2. Reliability of an Instrument

We always use the word reliable in our day to day activities. When anyone says that any individual is reliable what is this mean! It means that he or she is honest, stable, consistent, dependable and predictable also. Pertaining to the research instrument the concept of reliability got a similar meaning. If any tool or an instruments of the research is stable and consistence, predictable and accurate the it is told to be reliable instrument. When there is a greater degree of consistent and stability of the tool then there is a greater the reliability of an instrument. Therefore a test or an examination is reliable to the amount that repeat calculation made by this under continual conditions may be the same result (Kalton & Moser 1989: 353).

The idea of reliability could be observed at from two edges:

1. How reliable is an instrument?
2. How unreliable is the instrument?

The first query emphases on the capability of a tool to crop consistent measurements. When the researcher collect the similar set of data more than once by using the same tool and get the same or alike results under the same conditions, then the instrument is measured to be reliable. The second query attentions on the amount of inconsistency in the computation made by tool that is, the degree of alteration in the dimensions when researcher gather the similar set of data more than one time by utilizing the same tool under the similar or same circumstances. Therefore, the degree of inconsistency in the dissimilar measurements is a suggestion of the degree of its incorrectness. This 'mistake' is a replication of tool unreliability. Hence, reliability is said to be the degree of accuracy in the capacities made by a research tool or an instruments. This is said to be however the lower the degree of 'mistake or error' in the tool, there may be higher the reliability.<sup>7</sup>

For example when the researcher wants to develop questionnaire to determine the knowledge of the participants in the population, the investigator should prepare an instruments like the questions and administer this tool to the five percentages of the samples. The instrument should be administered to the same sample in the population under

same condition. The result of the two administration of the questionnaires is similar or same the instruments is reliable otherwise it is unreliable.<sup>7</sup>

### 2.1. Factors affecting the reliability of a research tool

It is not possible to have the hundred percent, exact and accurate research tool in the social sciences the reason is not only because a research tool cannot be accordingly, but also because it is not possible to control the variables which affect the reliability.

Some of these factors or variables are under the following:

#### 2.2. The physical location or situation

Some time when the instrument is being tested in a different location or change in the interview setting while conducting an interview may affect the response of the interviewee in turns it may affect the reliability of the constructed tool or instrument.

#### 2.3. The mood of respondent's

The reliability of the tool or an instrument may change when there is a change of mood of the respondents, since the response of the questionnaires or any opinions is always subjective so the subjectivity also change when there is a change of the mood of the subjects.

#### 2.4. The mood of an interviewer's

The interviewer mood also one of the important factor where it may change the mood of the respondents as well as it might affect the responses of the respondents. By this the reliability of the constructed tool also affected and leads to negative impact of the tool.

#### 2.5. The wording of the questions

A slight uncertainty in the phrasing and wording of question or questionnaires or statements could affect the reliability of a research tool because the respondents may interpret the question in a different way at different period it may leads to different responses from the respondents.

#### 2.6. The regression impact of an instrument

When the researcher want to check the attitude towards any issue some time the responders in first time may explained their opinion in a different way and they will feel it in a negative way and next time when you ask the same question in a different period of time the responders may give a different opinion. This may affect the real reliability of an instrument.

## 2.7. The nature of interaction

While conducting an interview, there is a significant alteration of the responses between the interviewer and the interviewee when there is an interaction between them. In case of repeat interaction in an interview the respondent may give different responses which may land in to the unhealthy reliability.<sup>8</sup>

## 2.8. In quantitative research methods of explaining the reliability of the tool

There are a different ways of defining the reliability of an apparatus and are classified in to two ways i.e. either internal consistency or an external consistency procedures.

## 2.9. Procedure related to internal consistency of tool

The main idea or a concept of this procedure of reliability is that if the questions or items are reliable this will gives the same or similar results with a repetition of the procedure in a phenomenon irrespective of their number in an instrument. Even if you select a few or less items or questions out of the main instrument to estimation of the reliability of the constructed tool, each area or segment of questionnaires which are constructed should replicate reliability more or less to the similar degree or extent. It is stand upon the logic that suppose the each item or the question is a pointer of some feature of an occurrence, then the each section built will still replicate in a different features of the occurrence even though there may be a only few items. Therefore, even if researcher declines the number of questions in the instrument, however they imitate some aspect of an occurrence, a smaller number of questions can offer an indication of instrument reliability. The procedure involved in internal consistency is purely based upon this logic only.<sup>9</sup>

The following method is commonly used for measuring the reliability of an instrument in this way:

## 2.10. The split-half method

This method is intended to associate half of the questions with another half set of the items and is suitable for tool that are planned to compute the attitudes towards an occurrence. In this procedure the items or the questions or the statements are separated or split in a half in such a fashion that any two items of questions or may be a statements in an instrument proposed to measure the identical facet fall into different shares or halves. The correlation of the score will be done after getting from administering two halves. Then the reliability is computed by utilizing statistical methods in between scores acquired from the two halves.<sup>10</sup>

## 2.11. Procedure related to external consistency of the tool

In this external consistency procedure the investigator compare the findings from the two independent courses of information collected with each other and as a means of authenticating the reliability of the portion or extent. There are two types or methods of external consistency those are as follows:

### 2.11.1. Test-retest or repeatability test method

This method is one of the commonly used techniques for establishing the reliability of a research instrument. In this procedure the instrument is administered once at a time and then once again in next movement but under the similar or same conditions. The ratio between the scores of the test and retest procedure is a clue of the reliability of the tool. However, the ratio is greater the reliability of the instrument also superior and the less the ratio, inferiority of the reliability. In other hand the difference between the test and retest score is zero which indicate that there is a hundred percent reliability.

1. Advantages of the test and retest reliability is this procedure allow the tool to be compared with itself, so this will avoid the kind of hitches that could ascend with the usage of another instrument.
2. The disadvantage of test retest method of reliability procedure is that a respondent might recall the replies or reactions that he or she already given in first round of answers which will impact the reliability of an instrument instantly. Because of the instrument is reactive and educative in nature this method will not give an exact reliability of an instrument. If the researcher wants to increase the ratio between the two scores the responds may give extra time span between two tests even though this also may affect the reliability of other reasons such as it is not possible for the researcher to provide the same or similar situation for the two test and the respondents become matured in the second test.

### 2.11.2. Parallel forms of the same test

In this type of procedure an investigator formulate the two tools or instruments which are planned to measure the same occurrence. These prepared two tools are then administered to the two similar groups of people. Then the comparison of two test score could be done. The results or the ratio between two tests are similar, and then you can come to the conclusion that the constructed instrument is reliable.

1. The advantage of this type of procedure is it does not agonize from the issue of recall originate in the test-retest method.
2. A disadvantage is that researcher needs to develop two tools instead of one tool.<sup>11</sup>

### 3. Procedure for Testing Reliability

There are two different stages in testing reliability of a research instrument so named development of tool or questionnaires and estimation or testing of reliability by statistical method.

#### 3.1. Stage-1: Development of tool

Development of tool or questionnaires has got three steps again, those are identification of different domains of content, preparing of an items or questionnaires and finally construction of an instrument or tool.<sup>12</sup>

The beginning step is to determine different domains of the content. Domain of the content is the different area of the content which instrument is prepared. It requires gathering of more idea of construct. It can be met by reviewing the literature, collecting the information with relevant subjects and discussion with expertise members.<sup>13</sup>

The second step is to generate an item or questionnaires. Generate the questionnaires in such a way that the items should be in a logical way so that questionnaires are similar and relevant to research questionnaires. The last step is to construct the instrument. In this step questionnaires are drawn from the main content domain and refined and finally organized. These questionnaires are now ready for content validity. After analysis of content validity this tool is refined and make ready for reliability checking.

#### 3.2. Stage-2: Reliability testing

Split-half method is one of the sub types of reliability testing of internal consistency reliability. The process of testing a split-half reliability is start with splitting questionnaires in two halves. Splitting items by many ways i.e. first half one side and second half another side or by splitting odd and even number questions. The whole test is administered to a single group of an individuals, the total score of each half set is calculated and at lastly the split-half reliability is calculated by computing the correlation between the two halves score. If there is a similarity between score of two halves it shows that the test has got internally reliable.<sup>14,15</sup>

## 4. Methodology

In this study as per prepared objectives and hypothesis it was necessary to develop a tool i.e. structured knowledge questionnaires regarding simulation in nursing education.

#### 4.1. Phase-1: Development of structured knowledge questionnaires

At the beginning phase total of 42 multiple choice questionnaires were prepared. Then later the questions were checked for language difference, overlapping, duplication, and grammar mistake and question format. The final draft of questionnaires was developed which consist of 30 questions

with different categories such as introduction, definition, meaning, and types of simulation, advantages of simulation and significance of simulation in nursing education. The illustration of the questionnaires under different category is as follows.

**Table 1:** Blue print of questionnaires under different category

S. No.	Items	Questionnaires
1	Introduction, Meaning, Definition of simulation and difference between Simulation & skill lab	1-13
2	Types of Simulators	14-26
3	Advantages of simulation in nursing	27-28
4	Significance of simulation in nursing education	29-30

#### 4.2. Phase-2: Experts opinion on structured knowledge questionnaires

In this phase the researcher identified experts with PhD in similar department and developed tool has been sent for opinion. After getting the experts opinions researcher computed the validity of an item and got the result as a valid tool.

#### 4.3. Phase-3: Testing reliability

In this phase the researcher used the split-half method to test internal consistence of the tool. Researcher made a two halve of questionnaires (Total questionnaires are 30) by separating odd and even numbers questions. (1, 3, 5, 7,9,11, 13, 15, 17, 19, 21, 23, 25, 27, 29 questions are in one group and the remaining question i.e. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30 are in another group). The nursing students who are studying in schools and college of nursing were selected for testing the reliability. The whole test is administered to a single group (i.e. 10 samples) of nursing students. The total score of each half was calculated.

## 5. Results

The reliability of the tool or knowledge questionnaires was calculated with Pearson Correlation Coefficient formula. The researcher got the 'r' Value which was 0.80. 'p' Value was 0.0047. (p<0.05 i.e. significant at 0.0047<0.05). This depicts a strong positive correlation, which means that high 'X' variable (First half) scores go with high 'Y' variable (Second Half) scores and vice versa. This showed that tool was highly reliable. From the findings of this research study researcher concludes that the structured knowledge questionnaire on simulation in nursing education is highly reliable.

**Table 2:** Computation of reliability

Odd (X)	Even (Y)	X- $\bar{x}$	Y- $\bar{y}$	(X- $\bar{x}$ ) <sup>2</sup>	(Y- $\bar{y}$ ) <sup>2</sup>	(X- $\bar{x}$ )(Y- $\bar{y}$ )
12	13	0.1	0.6	0.01	0.36	0.06
13	13	1.1	0.6	1.21	0.36	0.66
13	12	1.1	-0.4	1.21	0.16	-0.44
12	13	0.1	0.6	0.01	0.36	0.06
12	13	0.1	0.6	0.01	0.36	0.06
11	12	-0.9	-0.4	0.81	0.16	0.36
13	13	1.1	0.6	1.21	0.36	0.66
9	10	-2.9	-2.4	8.41	5.76	6.96
12	13	0.1	0.6	0.01	0.36	0.06
12	12	0.1	-0.4	0.01	0.16	-0.04
<b>Σ X=119</b>	<b>Σ Y=124</b>	<b>11.9</b>	<b>12.4</b>	<b>12.9</b>	<b>8.4</b>	<b>8.4</b>

## 6. Discussion

In this original research study researcher discussed about reliability of structured knowledge questionnaires regarding simulation in nursing education. In this session the researcher has divided the knowledge questionnaires in to two halves by odd and even number questions and later administered the two separate halves to the total of 10 nursing students who are studying in selected nursing schools and colleges. Then the investigator calculated the Pearson Correlation Coefficient of the scoring which is showed in the Table 2. According to the reliability calculation by Pearson Correlation Coefficient the structured knowledge questionnaires found to be highly reliable ( $r=0.80$ ). This depicted that the formulated questionnaires are highly reliable and fit for further administration. Now the questionnaires are ready for administration to the nursing students to test the formulated objectives and hypotheses.

## 7. Conclusion

In any instance any tool is constructed, it is necessary to measure the tool for its accuracy and exactness. Testing reliability is much important process in developing structured knowledge questionnaires. As per the Pearson Correlation Coefficient computation it was found that the constructed tool has got an excellent reliability (0.80) and ready for administration on nursing student to meet the formulated objectives.

## 8. Source of Funding

None.


## 9. Conflict of Interest

None.

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