

Case Report

# Physicians' Critical Thinking and Patients' Satisfaction Level: a Case Study of Tabriz Sina Treatment and Educational Center

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## Abstract

**Introduction:** Critical thinking is rational and sound thinking that involves investigation and review of opinions followed by actions and decision-making based on reasons with accurate and rational results. In our modern, complex world, we encounter multiple changes and competition in society, especially when it comes to using the latest technology; society must progress in this trend. Medical science is not exempt in this regard, considering that critical thinking is necessary in fulfilling its goals. This research aims to investigate the physicians' critical thinking and patient satisfaction level in the Tabriz Sina Treatment and Educational Center.

**Methods:** This study is both descriptive and analytical, and the statistical population involves all physicians and the patients of the Tabriz Sina Treatment and Educational Center in 2013. About 30 physicians and 170 patients were selected randomly, and data were collected using the Watson and Glaser critical thinking questionnaire, as well as the Mogimi and Ramazan patient satisfaction questionnaire. The data were then analyzed by Pearson correlation and regression analysis.

**Results:** The results showed that there was a significant and positive relationship between critical thinking and patient satisfaction in all dimensions except identification. Changes in critical thinking dimensions also changed patient satisfaction. The regression test showed that the critical thinking independent variable effect on the dependent variable was 0.558, which indicated a relatively strong correlation between these variables.

**Conclusion:** Although the critical thinking of the physicians and medical staff is important in patient satisfaction, there is no progress towards these goals in the health system. Healthcare authorities should try to empower critical thinking in order to achieve organizational goals.

## Introduction

While it is often simply taken for granted, thinking is an important issue for humans to consider closely, especially since the philosophy of life is based on it.<sup>1</sup> Critical thinking is one of the aspects of thinking.<sup>2</sup> Critical thinking is necessary for the comprehension of knowledge in any context.<sup>3</sup> Though the word "critical" may bring negative connotations to mind, critical thinking as a positive activity is considered a modern process for progress in society and its organization. It not only relates to learning in higher education, but also involves all interpersonal and work relationships.

Critical thinking is a positive activity,<sup>4</sup> and critical assessment of work conditions is a necessary and positive process for progress in any society or organization. The main duty of any organization is to provide possibilities to achieve staff competency. The aim of medical science is to develop the decision-making and self-efficiency skills of practitioners, which are influenced by critical thinking practice. Critical thinking is an important aspect of

occupational performance in medical science.<sup>5</sup> Physicians and medical staff must be able to think critically in order to be compatible with their roles, offer effective care-taking services and satisfy their patients regarding health system complexities.<sup>6</sup>

Patient satisfaction is one of the important goals of medical staff that plays a main role in the promotion of patient health.<sup>7</sup> Treatment centers aim to promote a healthy society and offer optimal clinical and medical services, so attention to the patients referred to these centers and their satisfaction is important. In this regard, diagnosis and treatment are the main dimensions of medical services provided. Medicine is a job that demands proper knowledge, attitude, experience and performance. It needs to progress, especially in the expansion of critical thinking and clinical decision-making.<sup>8</sup> Critical thinking is one of the components of clinical decision-making, and is a criterion for physician efficiency and an important factor in the promotion of medicine.<sup>9</sup>

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Our mental constructs dictate the necessity of critical thinking. Our minds generalize a concept for comprehension of the existence of a particular thing. For example, all marine creatures with a skeleton and swimming ability are called “fish,” and although this generalization cannot identify all of the marine creatures with skeleton that swim, when the mind uses “fish” in a conceptual way, we can then comprehend the wholeness with an understanding of the details.

Critical thinking is a tool for constructing new concepts. When we encounter unknown problems, we change our point of view, and observe the problems differently, which leads to an imbalance in the mind. This imbalance is a result of the fact that the mind cannot communicate and find a relationship with what it encounters (a new problem), and what it has previously encountered (experiences, memories and opinions). So, it improves the old forms to comprehend new forms.

Critical thinking is rational thinking that reviews and investigates our opinions, actions and decision-making based on rational reasons with correct results.<sup>10</sup> In our modern world, we encounter the need for change, and compete using the latest technology that we have to try to reach to perfection.<sup>11</sup> The ramifications of critical thinking on health subjects are not optional.

A person who possesses critical thinking skills cannot accept what is offered without investigation. This kind of thinking involves employing cognitive strategies and skills in order to increase optimal output.<sup>12</sup>

One who thinks critically examines solutions, and in this case, the responses are not applied, subjective, and emotional; rather, they are fundamental and real. Optimal educational discipline respects critical thinking, and by empowering, it assures the continuity of this kind of thinking. The person who thinks critically has a clear and correct attitude, and suffers less pressure resulted from imposed beliefs and contradictions.<sup>13</sup>

Treatment staff in hospitals apply critical thinking to solve patients' problems, and it is used in the decision-making process alongside creativity to enhance performance. It is an active mental process, and an essential process for safe, efficient and skillful medical intervention. Practical physicians with effective critical thinking skills have strong self-confidence, a positive impact on sustaining patients, clear detection of probable errors and good cooperation for teamwork, all of which increase their outcomes. Conversely, those with poor skills often fail to detect impending patient deterioration, resulting in a failure-to-rescue.<sup>14</sup>

Globalization and progress of technology necessitate critical thinking in medical sciences. The lessons learned in universities will be improved in the future as a result. For synchronization of these changes, critical thinking is a fundamental need in all fields of study in higher education.<sup>15</sup>

The health system is one of the scopes where critical thinking is a criterion for offering the best services.<sup>16</sup> Medical staff continuously try to improve their knowledge

and gain experience, and as they learn the latest technology for patient care, they should conform to the complexities of developed health systems for service offerings in order to gain patient satisfaction. Offering safe, efficient and effective services is the fundamental goal of the health system. So, in order to fulfill this goal, critical thinking is necessary. Physicians who think critically are highly self confident in their reasoning, and their success can be seen in the advocacy of patients, recognition of potential errors, proper collaboration with a medical team and offering integrated logic in their reasoning. According to the above-mentioned research, if critical thinking progresses in the Tabriz Sina Treatment and Educational Center, it will likely lead to further patient satisfaction, so it is necessary to work on physicians' critical thinking.

The main goal of this research was to investigate the relationship between physician critical thinking and patient satisfaction in the Tabriz Sina Treatment and Educational Center. That involves following objectives:

- Determination of the relationship between the physicians' deduction skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.
- Determination of the relationship between the physicians' assumed identification skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.
- Determination of the relationship between the physicians' inference skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.
- Determination of the relationship between the physicians' interpretation skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.
- Determination of the relationship between the physicians' rational assessment skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.
- Increasing patient satisfaction by development of the physicians' critical thinking.

### Materials and Methods

This research was applied from a goal-based perspective and aimed to collect the data to respond to the research questions and investigate the relationship between physician critical thinking and the patient satisfaction—therefore, it is a descriptive study.

In this research, data were collected by library and field study methods. The tools were taking notes for evaluation, and after extraction and compilation of the information, we used two Watson and Glaser questionnaires and a Mogimi and Ramazan patient satisfaction questionnaire from 2011. The statistical population involved 30 physicians and 170 patients of Tabriz Sina Treatment and Educational Center in 2013.

Due to the low number of studied physicians, all of the physicians of this center were studied.

For patient sample size calculation, Cochran's formula was used; considering a 95% confidence and 5% error, 170 patients were recruited using the simple random sampling method.

The questionnaires were distributed, and 30 physicians'

questionnaires and 150 patients' questionnaires were analyzed.

In order to measure the reliability of the questionnaires, 30 questionnaires were distributed randomly in this center. They were measured by Cronbach alpha coefficient. The reliability of the critical thinking questionnaire was achieved at 0.839, and it obtained 0.859 for the patient satisfaction questionnaire; results higher than 0.7 were reported as having good reliability. The validity of the questionnaires was measured by content validity using experts' and professors' opinions. In this step, after interviews with the professors and experts, it was confirmed that the questionnaire measured the traits considered by the authors.

The data were analyzed by inferential and descriptive statistics. A descriptive statistical method was employed for classification and interpretation of the data (tables and diagrams), and the Kolmogorov-Smirnov statistical test, Pearson correlation and regression test and SPSS software were used to test the hypotheses.

### Results

The results of the main hypothesis showed that the independent variable (physicians' critical thinking) and its components (deduction, inference, identification, interpretation and rational assessment) had an effect on the dependent variable (patient satisfaction) of 0.415, which indicated a strong correlation between two variables; there is a significant and direct relationship between them. Also, according to the level of change for each unit in the critical thinking variable, patient satisfaction reduces to 31%, which depicts following the dependent variable for each change unit in the independent variable that is positive.

### Discussion

In this part, we collected demographic characteristics such as gender, age, service years, educational level and place of residency of the physicians and the patients of the

Tabriz Sina Hospital (Table 1).

In order to use statistical tests to investigate the research hypotheses and parametric and non-parametric statistical tests, it is necessary to ensure the normal distribution of the variables. For normal distribution, similar hypotheses have been designed and tested:

H0: The data have been distributed normally.

H1: The data have not been distributed normally.

1-Sample K-S test has been used for survey on normal data distribution (Table 2).

According to the table, in all variables  $\text{sig} > 0.05$ , so, the hypothesis of zero is not critical thinking and patient satisfaction in Tabriz Sina Treatment and Educational Center.

Pearson correlation between the physicians' critical thinking and patient satisfaction

H0:  $\rho = 0$

H1:  $\rho \neq 0$

H0: There was no significant relationship between the physicians' critical thinking and patient satisfaction in Tabriz Sina Treatment and Educational Center.

H1: There was a significant relationship between the physicians' critical thinking and patient satisfaction in Tabriz Sina Treatment and Educational Center.

If significance level is higher than the error level, we conclude H0, and if the significance level is lower than the error, H1 is concluded.

According the critical thinking questionnaires results, the level of the physicians' critical thinking was moderate where the level of patient satisfaction was low.

According the critical thinking questionnaires results, where there was a moderate level of physician critical thinking, a low level of patient satisfaction was detected. Since the significance level was 0.000 and it was less than 0.05, H1 was concluded—there is a significant relationship between the two variables. The correlation coefficient is 0.415, which indicated the direct correlation between critical thinking and satisfaction (Table 3). Therefore, there

Table 1. The distribution of study participants by sex

Variable	Gender	Patients	Physicians
	Male	105 (70%)	22 (73%)
	Female	45 (30%)	8 (27%)
	Total	150 (100%)	30 (100%)

n (%) are presented.

Table 2. The results of Kolmogorov-Smirnov test to assess the normality of study variable

Variables	K-S	Sig	Result	
Critical thinking	Deduction	0.986	0.285	Normal
	Identification	0.894	0.4	Normal
	Inference	1.166	0.132	Normal
	Interpretation	0.810	0.528	Normal
	Assessment	0.808	0.532	Normal
	Critical thinking (total)	0.788	0.564	Normal
Patients satisfaction	Patients satisfaction(total)	1.240	0.092	Normal

was a positive relationship between the physicians' critical thinking and patient satisfaction. The main hypothesis was confirmed.

**First hypothesis**

There was a relationship between the physicians' deduction skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

Pearson correlation between the physicians' deduction skills and patient satisfaction

$H_0: \rho = 0$

$H_1: \rho \neq 0$

$H_0$ : There was no relationship between the physicians' deduction skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

$H_1$ : There was a relationship between the physicians' deduction skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

If the significance level is higher than the error level, we conclude  $H_0$ ; if the significance level is lower than the error,  $H_1$  is concluded.

Since the significance level was 0.000, and it is less than 0.05,  $H_1$  is concluded—there was a significant relationship between the two variables. The correlation coefficient was 0.508, which indicates the direct correlation between deduction and satisfaction (Table 4). Therefore, there was a positive relationship between the physicians' deduction skills and patient satisfaction. The first secondary hypothesis was confirmed.

**Second hypothesis**

There was a relationship between the physicians' identification skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

Pearson correlation between the physicians' identification skills and patient satisfaction

$H_0: \rho = 0$

$H_1: \rho \neq 0$

$H_0$ : There was no relationship between the physicians' identification skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

$H_1$ : There was a relationship between the physicians' identification skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

If the significance level was higher than the error level, we conclude  $H_0$ , and if the significance level was lower than the error,  $H_1$  is concluded.

Since the significance level was 0.062, and it is higher than 0.05,  $H_1$  was concluded, and there was no significant relationship between the two variables (Table 5). So, there was no relationship between the physicians' identification skills and patient satisfaction. The second hypothesis was rejected.

**Third hypothesis**

There was a relationship between the physicians' inference skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

Pearson correlation between the physicians' deduction

skills and patient satisfaction

$H_0: \rho = 0$

$H_1: \rho \neq 0$

$H_0$ : There was no relationship between the physicians' inference skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

$H_1$ : There was a relationship between the physicians' inference skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

If the significance level is higher than the error level, we conclude  $H_0$ , and if the significance level is lower than the error,  $H_1$  is concluded.

Since significance level is 0.000, which was less than 0.05,  $H_1$  was concluded, and there was a significant relationship between the two variables. The correlation coefficient is 0.571, which indicated a direct correlation between inference and satisfaction (Table 6). So, there was a positive relationship between the physicians' inference skills and patient satisfaction. The third hypothesis was confirmed.

**Fourth hypothesis**

There was a relationship between the physicians' interpretation skills and patients' satisfaction in Tabriz Sina Treatment and Educational Center.

Pearson correlation between the physicians' interpretation skills and patients' satisfaction

$H_0: \rho = 0$

$H_1: \rho \neq 0$

$H_0$ : There was no relationship between the physicians' interpretation skills and patients' satisfaction in Tabriz Sina Treatment and Educational Center.

**Table 3.** Results of Pearson correlation coefficient for the relationship between physician critical thinking and patient satisfaction

Correlation coefficient	Result	Error	Sig
0.415	Positive	0.05	<0.001

**Table 4.** Results of Pearson correlation coefficient for the relationship of physicians' deduction skills and patients' satisfaction

Correlation coefficient	Result	Error	Sig
0.508	Positive	0.05	0.000

**Table 5.** Results of Pearson correlation coefficient for relationship of physicians' identification skills and patients' satisfaction

Correlation coefficient	Result	Error	Sig
0.0706	Negative	0.05	0.062

**Table 6.** Results of Pearson correlation coefficient for relationship of physicians' inference skills and patients' satisfaction

Correlation coefficient	Result	Error	Sig
0.571	Positive	0.05	0.000

H1: There was a relationship between the physicians' interpretation skills and the patients' satisfaction in Tabriz Sina Treatment and Educational Center.

If the significance level is higher than error level, we conclude H0, and if the significance level is lower than the error, H1 is concluded.

Since significance level was 0.000 and it was less than 0.05, H1 was concluded, and there is a significant relationship between the two variables. The correlation coefficient was 0.531, which indicated the direct correlation between interpretation and satisfaction (Table 7). So, there was a positive relationship between the physicians' interpretation skills and patient satisfaction. The fourth hypothesis was confirmed.

**Fifth hypothesis**

There was a relationship between the physicians' rational assessment skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

Pearson correlation between the physicians' rational assessment skills and patient satisfaction

H0:  $\rho = 0$

H1:  $\rho \neq 0$

H0: There was no relationship between the physicians' rational assessment skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

H1: There was a relationship between the physicians' rational assessment skills and patient satisfaction in Tabriz Sina Treatment and Educational Center.

If the significance level is higher than the error level, we conclude H0, and if the significance level is lower than the error, H1 is concluded.

Since the significance level was 0.000, and it was less

than 0.05, H1 was concluded, and there was a significant relationship between the two variables. The correlation coefficient is 0.400, which indicated a direct correlation between physicians' rational assessment skills and satisfaction (Table 8). Therefore, there was a positive relationship between the physicians' rational assessment skills and patient satisfaction. The fifth hypothesis was confirmed.

Multiple linear regressions were used in order to investigate the effect of each critical independent variable on the dependent variable of patient satisfaction.

For multiple linear regressions between patient satisfaction and deduction, identification, inference, interpretation and rational assessment, the Enter method was used (Table 9).

**Main hypothesis**

There was a significant relationship between the physicians' critical thinking and patient satisfaction. The significance level of this test was 95%, and the main hypothesis was accepted when the significance level was less than 0.05. In other cases, the hypothesis is rejected, which indicated the lack of a significant relationship in a confidence level of 95%, and the regression equation is used.

According to the table, it can be said that the critical thinking independent variable's effect on the dependent variable (patient satisfaction) was 0.558, which depicted a strong correlation between the two variables. Also, according to the change level, for each unit in the critical thinking independent variable, satisfaction was changed 0.311, or 31%, which indicated the following of the dependent variable for each positive change in the independent variable (Table 10).

**Table 7.** Results of Pearson correlation coefficient for the relationship of physicians' interpretation skills and patient satisfaction

Correlation coefficient	Result	Error	Sig
0.531	Positive	0.05	0.000

**Table 8.** Results of Pearson correlation coefficient for relationship of physicians' assessment skills and patient satisfaction

Correlation coefficient	Result	Error	Sig
0.400	Positive	0.05	0.000

**Table 9.** Results of multiple linear regressions for relationship of physicians' critical thinking components and patient satisfaction

Dependant variable	Patients satisfaction				
	Deduction	Identification	Inference	Interpretation	Rational assessment
Independent variable					

**Table 10.** Summary statistics of model adequacy in multiple linear regression

Correlation coefficient	Change level	Adjusted correlation coefficient	Estimated SD
0.558 <sup>a</sup>	0.311	0.306	0.42730

a: predicting variables of deduction, identification, inference, interpretation and rational assessment

According to the table, it can be said that significance level was less than 0.05, which depicted the significance of the main hypothesis for the patient satisfaction regression equation (Table 11).

According to the table, the dependent variable regression equation can be written as follows:

$$\text{Patients satisfaction regression} = \text{deduction} + \text{inference} + \text{interpretation} + \text{rational assessment}$$

The critical thinking dimensions had a significant influence on patient satisfaction, and those used in the regression that had a significance level less of than 0.05 and the remainders are not used in the regression equation. Based on the aforementioned subjects, four dimensions of deduction, inference, interpretation and rational assessment were used in the regression because of significance, and the identification dimension was not used due to insignificant levels (Table 12).

### Conclusion

According to the results, by improving physician critical thinking, patient satisfaction will be improved according to deduction, inference, interpretation and rational assessment. As shown in the results, the effect of these items is more tangible than the identification dimension. Hospitals could fulfill their goals by investment in the physicians' critical thinking in order to enhance their overall customer satisfaction. In general, critical thinking in a society causes individuals to use their skills, and ignore irrational imitation, improve all sorts of people, including parents, teachers, policy makers, media and physicians. Critical thinking helps citizens to judge rationally and participate in solving social problems.

The author has offered propositions based on the testing of hypotheses and collecting of questionnaires. These

propositions take into consideration observations and interviews, familiarity with the current status, and physician critical thinking and its effect on patient satisfaction.

Critical thinking is a process that causes cognitive difficulties. Patients in the process of problem-solving may choose to remove their patient care plan. It is recommended to empower employees and management staff to provide appropriate context for critical thinking, so that they better perform their duties towards the patient care network.

Accountability in the management system of medical education, especially in the field of development work, is needed to provide health services with a particular focus on the structure of the health care team and maintain a flexible system of medical education to meet the staffing needs of the patients.

Motivation and medical staffing service providers are in the field of business promotion with various training courses, which are particularly important in the areas of critical thinking.

The research is based on literature studies, and the theoretical models that have been studied by Watson and Glaser ignore other models. Other researchers can be used to complete other studies with these models.

This research has been conducted in governmental hospitals and treatment and health centers, so it could also be conducted in private and governmental centers to compare the results.

The propositions are based on the theoretical foundations of critical thinking, path analysis and structural equation modeling studies of other cognitive variables that influence patient satisfaction.

Students and researchers are recommended to discuss future trends of critical thinking in organizations.

Table 11. The results of ANOVA table in multiple linear regression

Conversion	DF	SS	MS	F	p-value
Regression	5	31.255	0.183	57.060	0.000
Error	379	69.199	10.418		
Total	384	100.454			

Table 12. Results of multiple linear regression for relationship of physicians' critical thinking components and patient satisfaction

Variables	Nonstandard common factors		Standard common factors	T	Sig
	B	SD	Beta		
Constant	1.149	0.173		6.658	0.000
Deduction	0.327	0.074	0.252	4.419	0.000
Identification	-0.056	0.118	-0.056	-0.474	0.635
Inference	0.424	0.099	0.445	4.285	0.000
Interpretation	0.475	0.069	0.405	4.372	0.000
Rational assessment	0.302	0.302	0.233	4.495	0.000

The study was conducted in Tabriz Sina Hospital and Medical Center with hopes that in the future, researchers could study deprived areas-care centers and villages-and compare the results with the results of their study and identify differences and similarities.

### **Study Limitations**

This study was limited by several constraints of time and resources. A number of questionnaires were not referred to the researcher. This work was extremely labor-intensive, particularly as many respondents had a very low literacy level, and may not have had full understanding of the questionnaires. To enhance respondents' (patients') complete understanding and subsequent generalizability of the results, a detailed description of the study's questionnaires context was clearly elucidated for them. However, many times treatment personnel were busy and full of activity, which means they may not have had enough time to spend to ask the questionnaires most effectively.

### **Competing interests**

The authors declare that there is no conflict of interests.

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