

The Relationship Between Critical Thinking and Clinical Decision-Making in Emergency Nurses of Hospitals Affiliated to Zanjan University of Medical Sciences in 2020

Hadi Khanmoradi¹, [Ali Aghajanloo](#)^{2*}, Mohammadreza Dinmohammadi³, Farhad Ramazani-Badr³

¹MSc. in Nursing, Department of Critical Care Nursing, Nursing and Midwifery School, Zanjan University of Medical Sciences, Zanjan, Iran

²Assistant Professor, Department of Critical Care Nursing, Nursing and Midwifery School, Zanjan University of Medical Sciences, Zanjan, Iran

³PhD in Nursing, Associate Professor, Department of Critical Care Nursing, Nursing and Midwifery School, Zanjan University of Medical Sciences, Zanjan, Iran

***Corresponding Author Address:** Dr Sobouti (Gavazang) Blvd, Central Campus of Zanjan University of Medical Science, School of Nursing and Midwifery

Tel: 0098-9193481798

Email: aliaghajanloo2021@yahoo.com

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Abstract

Background: Critical thinking is a purposeful and self-directed judgment that is achieved through interpretation, analysis, evaluation, and inference. It makes nurses able to reason correctly about patient problems and issues and make the right decisions.

Objectives: The aim of this study was to investigate the status of critical thinking and clinical decision-making and determine their relationship with emergency department nurses.

Methods: This descriptive correlational study was performed among 320 nurses in the emergency department of hospitals affiliated to Zanjan University of Medical Sciences selected by available census method. The research instruments included the California Critical Thinking Skills Test (CCTST) and the 2014 Clinical Decision Making Scale (CDMS) by Lauri et al. Data analysis was performed using SPSS 19 software and descriptive and analytical statistics.

Results: The mean scores of clinical decision-making and critical thinking were 81.5 ± 1.35 and 10.05 ± 3.13 , respectively. There was a weak and significant positive correlation between clinical decision-making and critical thinking ($r=0.133$, $P=0.001$). Clinical decision-making was significantly associated with age, gender, and work experience, and critical thinking was significantly associated with age, education, and work experience ($P<0.05$).

Conclusion: Due to the poor critical thinking skill and the weak relationship between critical thinking and clinical decision-making observed, it is recommended to hold training and empowerment courses to strengthen critical thinking skills in nurses. On the other hand, strengthening critical thinking can improve nurses' clinical decision-making skills.

Keywords: *clinical decision making, critical thinking, emergency, nurses*

Introduction

Critical thinking is a purposeful and self-directed judgment that is achieved through interpretation, analysis, evaluation, and inference [1]. It is an organized mental process and plays a role in

decision-making and problem-solving [2]. Critical thinking is considered as a documentary and conceptual interpretation, a methodology, logical criticism, and thinking about something that should be evaluated [1]. It involves analyzing and

evaluating something with a view to improving it [3]. Critical thinking is one of the most important educational principles, and every society needs people with high critical thinking to achieve growth and prosperity [4] because critical thinking training leads to motivation to learn and to obtain problem-solving skills, decision-making, and creativity skills [5]. The development of critical thinking skills has been considered as an essential component of nurses' accreditation certification by the American National Nursing Association since 1986 [6]. Accordingly, critical thinking is logical thinking and reasoning about nursing problems, which have more than one solution, and leads to making the right decisions in situations where our beliefs and practices are different. As a result, critical thinking enables nurses to reason and judge correctly about patient-related problems and issues and to make the right decisions [7]. The factors affecting critical thinking are needed to be determined to indicate the effect of critical thinking on the public and the way people behave, especially in work environments, such as hospitals and emergencies. On the other hand, clinical decision-making is one of the important roles of nursing in patient care, and critical thinking can help the nurse to make the right decision [8]. It is an essential part of nursing professional practice and includes information analysis, decision-making, and proper application of these decisions in the clinical setting [9]. Therefore, clinical decision-making is a key competence for nurses, and efficient clinical reasoning is an essential component of nursing [10]. In this regard, Bakalis and Watson believe that nurses are often the first specialists to notice a rapid decline in the patient's physical health. Therefore, critical thinking is an essential tool for them to carefully examine clinical conditions in order to make quick and accurate decisions [11]. Nurses who want to be effective in today's highly complex and demanding clinical setting, need to acquire critical thinking skills to solve individual and environmental problems [12]. Clinical decision-making is a judgment that is the result of critical thinking; therefore, clinical evaluation and reasoning are some of the factors affecting the clinical decision-making process and have long been a criterion for recognizing the professionalism of nurses [13,14].

Regarding nurses' critical thinking and clinical decision-making skills, the results of several studies in Iran show that nurses' decision-making skill was at a moderate level [9,15]. Jafari et al. reported nurses with high critical thinking scores [16]. In another study conducted on the emergency department nurses, there was a positive relationship between critical thinking and clinical decision-making [8]. In addition, a significant relationship was found between critical thinking and decision-making in public hospital nurses [17]. In another cross-sectional study, it was found that there is no significant relationship between critical thinking and clinical decision-making of nurses [18]. Also, a review study on the relationship between critical thinking and clinical decision-making showed contradictory findings. This review showed that there is still insufficient evidence to prove a relationship between critical thinking and clinical decision-making. Therefore, conducting quality studies was suggested to authorities and researchers to assess the significant relationship between nurses' critical thinking and clinical decision-making skills [19]. Finally, considering the importance of these two variables and their relationship and the effect of critical thinking and clinical decision-making of nurses on safety and improving the condition of patients, there is a need to study these factors in nursing, especially in the emergency department. Accordingly, the present study was designed and conducted to investigate the status of critical thinking and clinical decision-making and to determine their relationship in emergency department nurses of Zanjan hospitals.

Methods

The present descriptive correlational study was performed in the emergency departments of hospitals affiliated to Zanjan University of Medical Sciences. The study population included all emergency nurses of hospitals affiliated with Zanjan University of Medical Sciences (338 people) in 2020. Sampling was performed by the available census method. Eighteen nurses did not fill the questionnaire completely, and finally, 320 questionnaires were analyzed. Inclusion criteria were nurses with Bachelor's and higher degrees working in emergency departments with at least six months of work experience and no cognitive

problems and mental illness (based on self-report).

Data were collected using a three-part questionnaire: The first part assessed demographic information, such as age, sex, marriage, education, nursing experience, emergency work experience, position in the ward, type of shift, and employment status. The second part was the California Critical Thinking Skills Questionnaire. This questionnaire has been adapted for Iranian culture because it has been widely used in various studies with an internal correlation coefficient of 0.9 and content validity of 0.75. It is a standard tool with 34 questions with four or five options. There is only one correct answer to each question; thus, each question is scored 0 or 1. A score of zero means a false answer, and a score of 1 means a correct answer, and the overall score varies between 0 and 34 [20]. Based on the score obtained, critical thinking is divided into two levels, strong and weak: a score of 16 and higher indicates strong critical thinking, and a score below 16 indicates weak critical thinking [21]. Cronbach's alpha coefficient of the Critical Thinking Questionnaire was estimated to be 0.7. The third part was the 2014 Clinical Decision-Making Scale (CDMS) by Lauri et al. This questionnaire has been used by Nouhi et al. (2012) in Kerman [18]. It has 24 questions (positive and negative answers) that are scored on a 5-point Likert scale (always=5 to never=1) [22]. The range of scores varies from 24 to 120, and a score of 68 or less indicates

analytical decision making, scores 68 to 78 indicate analytical-intuitive decisions, and scores 78 and higher represent intuitive decisions [22,23]. The reliability of the questionnaire in the present study was estimated to be 0.94 using Cronbach's alpha method.

After obtaining the ethics code, nurses were informed about the research objective and methodology and assured of the confidentiality of the data. They were provided with the questionnaires after obtaining written consent. Data were analyzed using SPSS software version 16 using descriptive (mean, standard deviation, percentage) and inferential statistical methods. Because of the lack of normal distribution of data, Spearman's test was used to determine the correlation between critical thinking and clinical decision-making, and also Kruskal-Wallis and Mann-Whitney tests were used to compare variables based on demographic characteristics. The significance level was considered to be less than 0.05.

Results

The majority of participants were female (65%), married (70%), with a bachelor's degree (97.5%) and a mean age of 33.21. 0.48 years. Regarding occupation, 52.5% had 1 to 5 years of nursing experience, 60% had 1 to 5 years of work experience in the emergency department, and 92.5% were a nurse. Also, 77.5% were shift workers, and 40% were found with apprenticeship employment (Table 1).

Table 1: Frequency of participants according to demographic characteristics

Variables	Categories	Number	%
Age	<25 y	56	17.5
	26-35 y	200	62.5
	36-45 y	56	17.5
	46-55 y	8	2.5
Gender	Male	112	35
	Female	208	65
Marital status	Single	96	30
	Married	224	70
Education	Bachelor's degree	312	97.5
	Masters' degree	8	2.5
Work experience	<1 y	24	7.5
	1-5 y	168	52.5
	5-10 y	64	20
	10-20 y	64	20
Work experience in the emergency department	<1 y	96	30
	1-5 y	192	60
	5-10 y	24	7.5
	10-20 y	8	2.5
Position in the emergency department	Supervisor	8	2.5
	Staff	16	5
	Nurse	296	92.5
Shift type	Shift workers	248	77.5
	Fixed morning shift	32	10
	Fixed evening shift	16	5
	Fixed night shift	24	7.5
Type of employment	Official (Permanent)	88	27.5
	Official (temporary)	8	2.5
	Contractual	19	6
	Formal	56	17.5
	Apprenticeship	128	40
	Corporate employment	21	6.5

Regarding critical thinking and clinical decision-making, the mean score of emergency nurses was 10.05 ± 3.13 and was 81.5 ± 1.35 , respectively. There was a weak and significant positive correlation between clinical decision-making and critical thinking ($r=0.133$, $P=0.001$).

In terms of age, there was a statistically significant difference between participants in critical thinking and clinical decision-making ($p=0.001$). Thus, the highest mean of clinical decision-making and critical thinking belonged to the age group of 36 to 45 years. There was also a statistically significant difference between both genders in terms of critical thinking ($p=0.006$) and clinical decision-making ($p=0.001$) so that the mean score of clinical decision-making and critical thinking was higher in the females. Regarding marital status, there was no significant difference between participants in the score of clinical decision-making and critical thinking ($P>0.05$). Critical thinking status showed a statistically significant difference regarding education level ($p=0.001$) so that the highest mean was related to those with a master's degree; however, the participants' clinical decision scores

based on their level of education did not show a statistically significant difference ($P>0.05$). In terms of nursing work experience, there was a statistically significant difference between the participants' critical thinking ($p=0.003$) and clinical decision-making scores ($p=0.001$). Regarding clinical decision-making, the highest mean was related to the group with less than 1 year of nursing experience, and in terms of critical thinking, the highest mean was related to the group with 10 to 20 years of work experience. Considering work experience in the emergency department, participants showed no significant difference in clinical decision-making ($p=0.347$); however, they showed a statistically significant difference in critical thinking ($p=0.001$), and the highest mean was related to the group with 5 to 10 years of experience in the emergency department. Regarding employment status, the participants showed a statistically significant difference in critical thinking and clinical decision-making ($p=0.001$), so that the highest mean in clinical decision-making and critical thinking was related to those with official (temporary) employment status (Table 2).

Table 2: Comparison of clinical decision-making and critical thinking scores of the participants in terms of demographic characteristics

Variables	Categories	Clinical decision-making			Critical thinking		
		Mean	SD	Test	Mean	SD	Test
Age	<25 y	85.43	15.68	Kruskal-Wallis X ² =28.348; P-value= 0.001	9.16	0.46	Kruskal-Wallis X ² =29.391; P-value= 0.001
	26-35 y	79.44	13.64		10.23	0.21	
	36-45 y	87.21	7.07		12.32	0.31	
	46-55 y	69.14	0.001		7.79	0.17	
Gender	Male	75.43	13.56	Man-Whitney X ² =68.48; Z= -6.088; P-value= 0.001	9.91	0.33	Man-Whitney X ² =9472; Z= -2.773; P-value= 0.006
	Female	84.85	12.26		10.14	0.19	
Marital status	Single	81.09	14.24	Man-Whitney X ² =1.115; Z= -1.127; P-value= 0.291	10.52	0.19	Man-Whitney X ² =68.48; Z= -0.509; P-value= 0.610
	Married	82.83	11.47		9.58	0.37	
Education	Bachelor's degree	81.54	13.65	Man-Whitney X ² =1120; Z= 496; P-value= 0.620	7.44	0.17	Man-Whitney X ² =448; Z= -3.115; P-value= 0.002
	Masters' degree	82.14	0.001		10.33	0.01	
Work experience	<1 y	89.67	4.59	Kruskal-Wallis X ² =29.428; P-value= 0.001	9.21	0.78	Kruskal-Wallis X ² =13.755; df= 3; P-value= 0.003
	1-5 y	78.76	15.99		10.13	0.24	
	5-10 y	82.75	9.92		9.58	0.37	
	10-20 y	84.63	8.90		11.54	0.31	
Work experience in the emergency department	<1 y	80.75	12.95	Kruskal-Wallis X ² =3.304; P-value= 0.347	10.23	0.31	Kruskal-Wallis X ² =18.439; P-value= 0.001
	1-5 y	82.38	14.36		9.87	0.22	
	5-10 y	78.13	9.62		10.32	0.61	
	10-20 y	82.21	0.001		7.11	0.01	
Type of employment	Official (permanent)	84.73	7.62	Kruskal-Wallis X ² =36.166; P-value= 0.001	9.84	0.25	Kruskal-Wallis X ² =90.777; P-value= 0.001
	Official (temporary)	95.89	0.001		15.18	0.01	
	Contractual	85.41	13.23		6.34	0.39	
	formal	79.18	22.35		11.16	0.19	
	Apprenticeship	78.38	22.14		9.12	0.29	
	Corporate employment	83.30	10.42		10.17	0.17	

Discussion

The aim of this study was to investigate the status of critical thinking and clinical decision making and determine their correlation in nurses working in the emergency department of hospitals affiliated to Zanjan University of Medical Sciences. The results showed that the critical thinking skill was at a poor level among emergency nurses working in hospitals affiliated to Zanjan University of Medical Sciences. The results of some studies are not consistent with the results of the present study. Madadkhani and Niko Goftar (2015) showed a high level of critical thinking in nurses [24], which can be due to the training and strengthening of emotional

intelligence skills among nurses. Jafari et al. also reported a high level of critical thinking in nurses. This difference could be due to reason that they assessed all nurses, especially those working in critical wards, and most nurses were highly experienced. Eiskosh & Amiet (2011) also believe that the level of critical thinking is high among nursing students [25] due to the training of critical thinking skills in different academic courses. In contrast, Grosser & Lombard (2008) found that critical thinking skill among nurses in Turkey was at a low level because most of them did not have enough knowledge of this skill [26], which was consistent with the results of the present study. Kelley believed that the low level of critical

thinking skills among nurses indicates that these people are confused about adopting new skills in emergencies, which may negatively affect their clinical decision-making and patient care in the emergency department [27].

Our results also showed that the clinical decision-making score of emergency nurses was at a moderate level (intuitive decision), which indicates that they respond to daily events in the emergency department at a moderate level. In this regard, Moharmeh et al. (2016) showed that clinical decision-making in nurses is above the average level. They concluded that the high level of clinical decision skill of nurses is due to their work independence, experience, and skills, as well as mutual decisions [28], which is consistent with the results of the present study. In contrast, Karimi Naghandar et al. (2013) showed that nurses had a lower level of clinical decision-making skills, which may be because of the lack of efforts to improve these skills in planning and educating students [22] and it was not consistent with our results. Ramazani Badr and Shaban (2010) also believe that clinical decision-making skill in nurses is at a low level and needs to be strengthened and trained using operational and educational programs [29]. Therefore, it seems that the average score of this skill is not an acceptable level for emergency department nurses and requires comprehensive planning to be strengthened. In this regard, Arzani et al. (2016) showed that with increasing nurses' clinical experience, their decision-making skill improves [30].

There was a weak and significant correlation between clinical decision-making and critical thinking; as critical thinking increases in nurses, their intuitive decision-making in the face of changes in the patient's condition, especially in critical situations, increases. Parsapour et al. (2005) showed that there is no statistically significant relationship between critical thinking and clinical decision-making [31]. In addition, other studies reported that there is no statistically significant relationship between critical thinking skills and clinical decision-making [8,32]. In contrast, Beigi and Abedini (2014) believed that there is a significant relationship between nurses' decision-making and critical thinking [33]. According to the findings of this study, this can be attributed to the training of critical thinking skills

during education to strengthen this skill in nurses to make decisions in critical situations. Previous studies have shown that the reason for the poor relationship between critical thinking and clinical decision-making is the lack of appropriate research tools to measure the relationship between the two variables. Also, the lack of appropriate training of nurses and their low experience are effective in this regard [28,30-36]. Nibbelink et al. (2018) state that a low level of critical thinking and clinical decision-making skills in nurses require efforts to improve these skills through planning for educating nursing students and continuous educational programs [34]. Therefore, by strengthening critical thinking in nurses, their clinical performance and clinical decision-making skills to improve the condition of emergency patients are affected.

Regarding the relationship between clinical decision-making and critical thinking with nurses' demographic characteristics, it was found that clinical decision-making has a significant relationship with age, gender, nursing work experience, and employment status and critical thinking with age, education, and work experience in the emergency department. Considering the number of significant demographic characteristics, critical thinking and clinical decision-making skills are affected by the behavioral and individual characteristics of nurses. Consistent with the present study, Ludin et al. (2018) believe that clinical decision-making is associated with work experience and age [35] because, with increasing age, nurses' skills and accuracy increase over time, and they make more rational decisions. However, according to the results of Salehi et al. (2007), the demographic characteristics of gender and education have no significant relationship with clinical decision-making and critical thinking because gender and level of education cannot be a good factor for measuring clinical decision-making skills [8] that did not agree with the results of the present study. Also, Kaya et al. (2012) showed that the demographic characteristics of nurses do not affect their clinical decision-making skill, and this skill should be trained during their education [36].

Research Limitations

Psychiatric-emotional conditions of nurses and human crowds in the emergency department could affect how to complete the questionnaire.

Therefore, it was tried to fill in the questionnaires during the middle hours of the shift and as much as possible, when few cases were visiting the emergency department.

Conclusion

The results showed that the critical thinking skill of emergency nurses was at a poor level and the clinical decision status of emergency nurses was at a moderate level (intuitive decision-making). It seems that special emphasis should be placed on teaching these skills. A poor relationship between clinical decision-making and critical thinking can be challenging when it negatively affects nurses' performance in the emergency department, which was not investigated in the present study. On the other hand, due to the weak relationship between clinical decision-making and critical thinking of nurses and the importance of clinical decision-making among nurses, and the positive effect of critical thinking on the ability to make appropriate decisions, training and strengthening critical thinking skills of emergency nurses should be highly considered.

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Conflict of interest

The authors hereby declare that there is no conflict of interest.

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References

1. Mohammadi D, Moslemi Z, Ghomi M. The relationship between critical thinking skills with creativity and academic achievement in students Qom University of Medical Sciences. *Educ Strategy Med Sci*. 2016; 9(1): 79-89. [In Persian]
2. Baradaran M, Mohammadipour M, Mahdian H. Math problem solving ability of students based on

- critical thinking skills with mediator role of achievement motivation and attitude towards mathematics. *J Educ Psychol Stud*. 2020; 17(37): 26-52. [In Persian]
3. Aarsal Z. The effects of microteaching on the critical thinking dispositions of pre-service teachers. *Aust J Teacher Educ*. 2015; 40(3): 140-53.
4. Mohammadi D, Moslemi Z, Ghomi M. The relationship between critical thinking skills with creativity and academic achievement in students Qom University of Medical Sciences. *Educ Strategy Med Sci*. 2016; 9(1): 79-89. [In Persian]
5. Aghaee N, Soori R, Ghanbari S, Hamedan J. Comparison of the relationship between critical thinking and academic achievement among physical education students and students in other fields of study in BuAliSina University. *Research in Sport Management and Motor Behavior journal*. 2017; 2(4): 35-46.
6. Ebadi M, Azarmi S, Farsi Z, Pishgooie A. Critical thinking and appropriate decision-making in nursing process. *J School of Army Nurs*. 2010; 12(1): 30-4. [In Persian]
7. Wilgis M, McConnell J. Concept mapping: An educational strategy to improve graduate nurses' critical thinking skills during a hospital orientation program. *J Contin Educ Nurs*. 2008; 39(3): 119-26.
8. Salehi SH, Bahrami M, Hosseini SA, Akhondzadeh K. Critical Thinking and Clinical Decision Making in Nurse. *Esfahan Univ Med Sci Health Servi Pub*. 2020; 1(1): 1-246.
9. Bahmanpour K, Navipour H, Ahmadi F, Kazemnejad A. A concept analysis of critical thinking in clinical nursing. *Sci J Kurdistan Univ Med Sci*. 2017; 22(2): 96-109. [In Persian]
10. Canova C, Brogiato G, Roveron G, Zanotti RJJocn. Changes in decision-making among Italian nurses and nursing students over the last 15 years. *J Clin Nurs*. 2016; 25(5-6): 811-18.
11. Lee DS, Abdullah KL, Subramanian P, Bachmann RT, Ong SLJJocn. An integrated review of the correlation between critical thinking ability and clinical decision-making in nursing. *J Clin Nurs*. 2017; 26(23-24): 4065-79.
12. Brunt BA. Critical thinking in nursing: An integrated review. *J Contin Educ Nurs*. 2005; 36(2): 60-67.

13. Nikbakht nasrabadi A PS, Valiee S. Applying the Critical Thinking in Nursing Process. Tehran: Jame-e-Negar Pub; 2009. [In Persian]
14. Cappelletti A, Engel JK, Prentice DJJoNE. Systematic review of clinical judgment and reasoning in nursing. *J Nurs Educ.* 2014; 53(8): 453-8.
15. Hancock B, Helen C, Patrick RE. The decision-making processes of nurses when extubating patients following cardiac surgery: an ethnographic study. *Inter J Nur stud.* 2006; 43(6): 693-705.
16. Jafari H, Taghavi Larijani T, Ghadirian F, Emamzadeh Ghasemi H. The Association of Competence and Critical Thinking in the Nurses in Imam Khomeini Hospital, Affiliated to Tehran University of Medical Sciences, Iran. *Iran J Nurs.* 2019; 32(121): 28-43. [In Persian]
17. Shahraki Moghaddam E, Manzari Z, Ghandehari Motlagh Z. The Evaluation of Nurse,s Clinical Decision Making in Intensive Care Unit at the Teaching Hospitals of Mashhad. *J Sabzevar Univ Med Sci.* 2017; 24(2): 107-13. [In Persian]
18. Noohi E, Karimi-Noghondar M, Haghdoost A. Survey of critical thinking and clinical decision making in nursing student of Kerman University. *Iranian journal of nursing and midwifery research.* 2012;17(6):440-49.
19. Lee DS, Abdullah KL, Subramanian P, Bachmann RT, Ong SL. An integrated review of the correlation between critical thinking ability and clinical decision-making in nursing. *J Clin Nurs.* 2017; 26(23): 4065-69.
20. Facione P. Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. *Delphi Report.* 1990;3(1):102-14.
21. Banning M. Measures that can be used to instill critical thinking skills in nurse prescribers. *Nurse Educ Pract.* 2006; 6(2): 98-105.
22. Karimi Noghondar M, Rahnama Rahsepar F, Golafrooz M, Mohsenpour M. Comparison of Critical Thinking and Clinical Decision Making Skills Among the Last-Semester Nursing Students and Practicing Nurses in Sabzevar University of Medical Sciences. *Iran J Med Educ.* 2013; 12(12): 916-24. [In Persian]
23. Phillips BC. *Clinical Decision Making in Last Semester Senior Baccalaureate Nursing Students.* Wisconsin: Wisconsin-Milwaukee; 2015.
24. Madadkhani Z, Nikoogoftar M. Critical Thinking in Nurses: Predictive Role of Emotional Intelligence. *Hayat.* 2015; 20(4): 77-88. [In Persian]
25. Eisenberg DJ. How Senior Managers Think. *Harvard Business Review.* 1984; 62(5): 80-90.
26. Grosser MM, Lombard BJJ. The relationship between culture and the development of critical thinking abilities of prospective teachers. *Teach Educ.* 2008; 24(3): 1364-75.
27. Kelley TA. Critical Thinking and Case Management. *Case Manag.* 2003; 14(3): 70-2.
28. Moharmeh TE, Archibald TN, Tencnbaum G. Individual and team annotation effects on students' reading comprehension, critical thinking, and meta-cognitive skills. *Comput Hum Behav.* 2010; 26(6): 1496-507.
29. Ramazani Badr F, Shaban M. Clinical Decision-Making Skills among the Fourth-Year Baccalaureate Nursing Students in Tehran University of Medical Sciences. *J Med Educ Dev.* 2010; 2(3): 17-25. [In Persian]
30. Arzani A, Lotfi M, Abedi AR. Experiences and Clinical Decision-making of Operating Room Nurses Based on Benner's Theory. *J Babol Univ Med Sci.* 2016; 18(4): 35-40.
31. Parsapour AR, Parsapour MB, Larijani B. Informed Consent, Contents, Conditions and Practical Methods. *Iran J Diabet Lipid Disord.* 2005; 5: 1-14. [In Persian]
32. Heyes LM. Critical care nurses' use of decision-making strategies. *J Clin Nurs.* 2014; 12(1): 476-83.
33. Beigi R, Abedini S. The Effect of Decision Making Training on Critical Thinking in Nursing Students. *J Dev Strateg Med Educ.* 2014; 1(2): 18-26. [In Persian]
34. Mohammadi A. *The Relationship between Critical Thinking of Training Managers with their Organizational Change Management [Dissertation].* Mashhad: Mashhad Ferdowsi University; 2001.
35. Ludin SM. Does good critical thinking equal effective decision-making among critical care nurses? A cross-sectional survey. *Intensive Crit Care Nurs.* 2018; 44(3): 1-10.
36. Kaya H, Yalniz N. Critical thinking dispositions of emergency nurses in Turkey: a cross-sectional study. *Hong Kong J Emerg Med.* 2012; 19(3): 198-203.