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

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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 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 in the emergency department | <1 y | 24 | 7.5 |
|                                    | 1-5 y      | 168    | 52.5|
|                                    | 5-10 y     | 64     | 20  |
|                                    | 10-20 y    | 64     | 20  |
| Work experience                     | <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                         | Fixed morning shift | 32 | 10 |
|                                    | Fixed evening shift | 16 | 5  |
|                                    | Fixed night shift | 24 | 7.5 |
|                                    | 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).
The relationship between critical thinking and clinical, ....

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 X2=28.348; P-value= 0.001 | 9.16   | 0.46 | Kruskal-Wallis X2=29.391; P-value= 0.001 |
|                                | 25-35 y           | 79.44  | 13.64 | X2=68.48; Z=-6.088; P-value= 0.001 | 9.91   | 0.33 | Man-Whitney X2=9472; Z=-7.773; P-value= 0.006 |
|                                | 36-45 y           | 87.21  | 7.07  | X2=1.127; Z=0.291 | 10.14  | 0.19 | Man-Whitney X2=68.48; Z=-0.509; P-value= 0.610 |
|                                | 46-55 y           | 69.14  | 0.001 | X2=1120; Z=496; P-value= 0.620 | 10.33  | 0.01 | Man-Whitney X2=448; Z=-3.115; P-value= 0.002 |
| Gender                         | Male              | 75.43  | 13.56 | Man-Whitney X2=1.127; Z=0.291 | 7.44   | 0.17 | Man-Whitney X2=1320; Z=496; P-value= 0.001 |
|                                | Female            | 84.85  | 12.26 | X2=36.166; Z=-12.27; P-value= 0.001 | 10.35  | 0.22 | Man-Whitney X2=68.48; Z=-0.509; P-value= 0.610 |
| Marital status                 | Single            | 81.09  | 14.24 | Man-Whitney X2=1.127; Z=0.291 | 9.58   | 0.37 | Man-Whitney X2=68.48; Z=-0.509; P-value= 0.610 |
|                                | Married           | 82.83  | 11.47 | X2=1320; Z=496; P-value= 0.620 | 10.33  | 0.01 | Man-Whitney X2=448; Z=-3.115; P-value= 0.002 |
| Education                      | Bachelor’s degree | 81.54  | 13.65 | Man-Whitney X2=1120; Z=496; P-value= 0.620 | 7.44   | 0.17 | Man-Whitney X2=1320; Z=496; P-value= 0.001 |
|                                | Masters’ degree   | 82.14  | 0.001 | X2=1320; Z=496; P-value= 0.620 | 10.33  | 0.01 | Man-Whitney X2=448; Z=-3.115; P-value= 0.002 |
| Work experience                | <1 y              | 89.67  | 4.59  | Kruskal-Wallis X2=29.428; P-value= 0.001 | 9.21   | 0.78 | Kruskal-Wallis X2=13.755; P-value= 0.003 |
|                                | 1-5 y             | 87.76  | 15.99 | X2=1120; Z=496; P-value= 0.620 | 10.13  | 0.24 | Man-Whitney X2=1320; Z=496; P-value= 0.001 |
|                                | 5-10 y            | 82.75  | 9.22  | X2=1320; Z=496; P-value= 0.620 | 9.58   | 0.37 | Man-Whitney X2=1320; Z=496; P-value= 0.001 |
|                                | 10-20 y           | 84.63  | 8.90  | X2=1320; Z=496; P-value= 0.620 | 11.54  | 0.31 | Man-Whitney X2=1320; Z=496; P-value= 0.001 |
| Work experience in the         | <1 y              | 80.75  | 12.95 | Kruskal-Wallis X2=3.304; P-value= 0.347 | 10.23  | 0.31 | Kruskal-Wallis X2=18.439; P-value= 0.001 |
| emergency department           | 1-5 y             | 82.38  | 14.36 | X2=3.304; P-value= 0.347 | 9.87   | 0.22 | Kruskal-Wallis X2=18.439; P-value= 0.001 |
|                                | 5-10 y            | 78.13  | 9.62  | X2=3.304; P-value= 0.347 | 10.32  | 0.61 | Kruskal-Wallis X2=18.439; P-value= 0.001 |
|                                | 10-20 y           | 82.21  | 0.001 | X2=3.304; P-value= 0.347 | 7.11   | 0.01 | Kruskal-Wallis X2=18.439; P-value= 0.001 |
| Type of employment             | Official (permanent) | 84.73  | 7.62  | Kruskal-Wallis X2=29.428; P-value= 0.001 | 9.84   | 0.25 | Kruskal-Wallis X2=29.428; P-value= 0.001 |
|                                | Official (temporary) | 95.89  | 0.001 | X2=29.428; P-value= 0.001 | 15.18  | 0.01 | Kruskal-Wallis X2=29.428; P-value= 0.001 |
|                                | Contractual       | 85.41  | 13.23 | Kruskal-Wallis X2=36.166; P-value= 0.001 | 6.34   | 0.39 | Kruskal-Wallis X2=90.777; P-value= 0.001 |
|                                | Corporate         | 79.18  | 22.35 | X2=36.166; P-value= 0.001 | 11.16  | 0.19 | Kruskal-Wallis X2=90.777; P-value= 0.001 |
|                                | Apprenticeship    | 78.38  | 22.14 | X2=36.166; P-value= 0.001 | 9.12   | 0.29 | Kruskal-Wallis X2=90.777; P-value= 0.001 |

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 is due to the lack of training and education in this field.

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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 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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