



Clinical Reasoning in Nursing Students

Hadi Darvishi Alamouti ^{1,*} , Malahat Nikravan Mofrad ² , Ziba Borzabadi Farahani ² , Amin Reza Amini ³ 

¹ MSc, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran

² Department of Medical Surgical Nursing, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran

³ School of Paramedical Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

*Corresponding author: Hadi Darvishi Alamouti, MSc, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran. E-mail: H_darvishi@sbmu.ac.ir

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Abstract

Introduction: Diagnosis and understanding of patient conditions require nurses' clinical reasoning skills, as in the absence of this skill; the nurses will not be able to diagnose the patients' condition and will impose harmful consequences on the patient. The purpose of this study is to evaluate and compare the clinical reasoning skills of the nursing students at Shahid Beheshti University of Medical Sciences at the end of theoretical courses in medical-surgical nursing in 2018.

Methods: In this descriptive-comparative study, 150 nursing students from freshmen, sophomores, and juniors studying at the Faculty of Nursing and Midwifery of Shahid Beheshti University of Medical Sciences were selected by stratified sampling method. Students in each year comprised one category and the total number of was 3, also the number of students per category was 50, and the total number of categories will be equal to 9. Data were collected using a researcher-made questionnaire employing Key Feature Problem (KFP) method and analyzed using descriptive statistics by SPSS V.20 software.

Results: The results showed that there is a significant difference between the grades of third-year students and those in their first and second years of study ($P < 0.001$). Based on the results, the clinical reasoning skill in the first year was poor ($51.59 \pm 0.06\%$), in the second year was very weak ($48.41 \pm 0.09\%$) and in third-year students was very weak (37.62 ± 0.88). Also, the average skill of clinical reasoning of all students was very weak with a mean percentage of 46.01%.

Conclusions: The findings indicate that the level of students' clinical reasoning skills has been declined comparatively from freshmen to juniors. In general, the level of clinical skills in nursing students of Shahid Beheshti University of Medical Sciences is disappointingly low.

INTRODUCTION

Humans feel sick during their lives and experience nursing care. However, in the 21st century, nursing is a difficult term for description and this concept is poorly understood by people. Some associate nursing with physical actions such as keeping the patient safe and tidy, living in comfort, and good nutrition. Some others consider nurses as a helping hand to doctors, helping them in the care and treatment. These are in fact part of the routine nursing practices. However, by virtue of clinical judgment in the processes of examination, diagnosis, and implementation and assessment, specialists and professionals differentiate nurses from routine care. This knowledge is based on assessing the

patient's needs and taking action to meet these needs, [1].

Changing needs of patients in the healthcare environments have made the nursing students' curriculum to be in need of a change so that they can think critically in their workplace and in the case of a need for a high-level thinking, be able to make a decent decision to solve patients' problems; this can bring very good consequences for patients. On the contrary, if nurses do not have sufficient skills in the clinical reasoning, they would not be able to diagnose and understand the conditions of patients, and when the patients' condition gets worse, they would not be able to

make good decisions and this may have serious consequences for the patients. The role of nurses in such situations is very important because they have to work on patient satisfaction, provide patient-centered care, and take evidence-based clinical interventions [2].

The first issue in every educational system is to drive learners from the stage of memorizing content to the reasoning (an innovative way of solving problems) [3]. The Reasoning is a thinking process that transforms an unfavorable condition (a problematic condition) into a favorable state through processing the considered issue [4]. Clinical reasoning in nursing is essential for the safe and effective care of patients. However, the use of an educational strategy to promote and develop learning in learners is a challenging work [5]. Nurses with sufficient clinical reasoning skills have positive effects on the results of patient care; on the other hand, those with poor skills of clinical reasoning are often unable to recognize the situations where the patient's condition is getting worse and therefore, fail to save the patient [6]. Nurse educators are responsible for educating nursing students on how to take care of patients in clinical settings, as well as assessing their understanding of the logic of clinical practices. One of the primary goals of clinical nursing educators is to promote critical thinking and develop clinical reasoning skills in students and fill out the gap between theoretical and practical education [7, 8]. Clinical reasoning in nursing is a cognitive process or strategy for nurses to realize the concept of data collected from patients in order to identify and diagnose the actual or potential problems of patients, make conscious clinical decisions to help solve a problem, and achieve positive outcomes in patients [9]. Clinical reasoning is an essential mental component for nurses, through which they can make the most accurate decision in the clinical settings and provide high-quality care for patients [10]. Clinical reasoning is the ability of a nurse to look at a large amount of data, and then accurately identify and apply appropriate nursing practices to address the identified problems during patient care [11]. Clinical reasoning is of great importance for learning and developing nursing care. Today, the effective use of clinical reasoning in complex care situations is one of the health care requirements to quickly assess nursing care needs. There is a link between the effective use of clinical reasoning skills and positive outcomes in patients; this means that a lack of these skills in nurses may lead to adverse outcomes for the patients [12]. Failure to properly solve the clinical problems may lead to the diagnostic errors and medical errors, which are often irreversible and result in the death of patients. Therefore, it is vital to teach clinical reasoning and make efforts in its promotion [13].

Clinical experiences have shown that nurses face with a variety of clinical reasoning. An experienced nurse, once

confronted with a patient, take a precise account of the patient's conditions and draw up the care plan based on this detailed description; this skill is usually run automatically. For nursing students, clinical reasoning is an essential skill to be learned. They should learn how to behave in a critical condition and make a wise decision. Therefore, it is necessary for them to get acquainted with the process of clinical reasoning step-by-step and learn how to gather information to reach a good decision [14]. Teaching and learning clinical reasoning is difficult due to its complexity. It can also be difficult for students to understand since it is difficult to be seen and gained access to clinical reasoning [15]. Ironside et al (2014) confirmed the need for better strategies in clinical education to improve the nursing students' reasoning skills. They also argued that although the change in nursing education is among the operational goal, there is a gap between the way of the development of clinical reasoning skills and their application in clinical settings [16]. A study conducted by Mensz et al (2015) showed that there are not enough studies on clinical reasoning skills, critical thinking, and clinical decision-making in undergraduate nursing students. If clinical reasoning is an initial process for collecting information by nurses and making decisions by them, more studies are expected to be conducted in this field to better understand this phenomenon and provide some evidence to guide nurses to learn more about the main challenges of nursing care [17]. Given the above-mentioned concerns, the development of clinical reasoning skills should be included in the undergraduate nursing curriculum. Despite the existence of many articles and models explaining the development of the clinical reasoning process, there are few articles discussing clinical reasoning in nursing students [10]. In the Nursing Graduate Program (approved in the 54th session of the Supreme Council of Planning in the Medical Sciences on May 17, 2014), critical thinking has been mentioned in the section of the capabilities and skills expected for nursing students; however, none of the clauses in this curriculum refer to the subject of clinical reasoning and how to enhance this skill, nor is a guide for nursing professors and instructors to teach the clinical reasoning skill in this curriculum. Since few studies in Iran have addressed the issue of assessing the clinical reasoning skills among nursing students [18]. Clinical instructors use only individual approaches and implementation of medical orders, conference presentations, etc., and less than group activities with a focus on the real patient with clinical reasoning and why in the implementation of the nursing process, including patient examination, nursing diagnosis, etc. Nursing education in a clinical setting first needs to focus on developing clinical reasoning skills in theoretical classes. Various studies have emphasized the evaluation of

clinical reasoning skills. However, studies that have evaluated this skill with the KFP (key feature problem) tool are limited. In this study, in addition to assessing the gap between theoretical and practical training, we have tried to use different tools to measure this skill. We are now faced with the question of how much nursing students focus on developing their clinical reasoning skills after entering university and until they graduate. And what is the role of educators in this area? In this study, the use of KFP tools shows us how effective the theoretical trainings have been and what the strengths and weaknesses of the trainings have been. The present study aims to determine the level of clinical reasoning skills in the nursing students of Shahid Beheshti University of Medical Sciences.

METHODS

This is descriptive-comparative research. This research was conducted at Shahid Beheshti University of Medical Sciences in 2018. The study population comprised the first to third-year nursing students in the nursing faculty of Shahid Beheshti University of Medical Sciences who completed theoretical courses of Medical-Surgical Nursing 1 or 2 or 3. A number of 150 nursing students were selected using a stratified sampling method. Sample size formula for estimating the mean of a clinical reasoning in nursing students from a finite population ($N \approx 400$ persons) with 95% confidence, the population variance (σ^2) of 0.8 (based on a pilot study) and a margin of error (MOE) no larger than 0.2 the required samples (n) were 100 persons. With design effect (an adjustment made to find a survey sample size, due to a sampling stratified sampling method) of 1.5 the total sample size was 150.

$$n_0 = Z\alpha/22 * \sigma / \text{MOE}^2,$$

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Proportional allocation (a procedure for dividing a sample among the strata in a stratified sample survey) was used to collect data from the population in order to estimate population mean of clinical reasoning. Since the size of all strata were almost the same, we select 50 persons in each of strata.

Students in each year comprised one category and the total number of o was 3, also the number of students per category was 50. The inclusion criteria consisted of 1. Theoretical courses in Medical-Surgical Nursing 1, 2 or 3, should be completed. 2. Subjects should lack nursing aid experience, 3. They should lack any failed course among the Medical-Surgical Nursing courses in the last semesters. According to the inclusion criteria, 50 people were selected from among the students each year and questionnaires were provided to them. The questionnaire of each scenario was given to the students separately and after completing it, another

questionnaire was given to them. Finally, they answered all 3 questionnaires. Due to the sensitivity of sampling, it was planned so that students would not distort the questionnaires so that all 50 questionnaires could be studied.

The research instrument was a researcher-made questionnaire designed by the "Key Feature Problem" (KFP) method [19] and following a printed guide [20] which evaluated students' clinical reasoning skills in 3 different years. The KFP format describes the clinical scenario of a patient, and then he poses a question that focuses solely on the main problem features. The questions frequently included several answers, and among these answers, students should choose those important and correct questions [21]. Actually, key features are points that are raised below the question text; the student's argument is involved in selecting these key points. In the proposed scenario, each question can have more than one correct answer, and the student responds to the questions in terms of the limits applied to the number of responses he chooses. The questionnaire consisted of 9 scenarios that included Medical-Surgical Nursing topics 1, 2 and 3. For each academic year, a scenario related to 3 patients was raised, where each of which included 4 spheres of nursing investigation, nursing diagnosis, nursing goals for each diagnoses, and nursing interventions. In other words, in the tool designed by the KFP method, we are looking for key points to solve the problem. And we need to set therapeutic priorities in treating patients. For example, in a patient presented with a diagnosis of myocardial infarction, the severity and nature of the pain is given priority over the examination of the cyanosis of the limbs, and is one of the key feature for the examination of this patient. The student should answer the questions posed in the clinical situation. Samples were selected by census method and strong and weak students were not separated from each other. There was a limited time to answer each questionnaire. Students answered the questions in the presence of the researcher. Data collection was performed in the nursing school environment. In this way, at the end of the academic year and after passing the relevant courses, the students responded to the scenario related to that course. In all the scenarios proposed, the student should select the items that they consider to be correct and a key to solving the patient's problem. (The number of items permitted for students to select was explained). Student responses were categorized into three areas: Correct answers, i.e. key features, near-correct or neutral answers that often involved routine actions, and wrong answers that were completely wrong. In order to score, the correct answers were assigned with score 1, and neutral or incorrect answers were assigned with zero scores. All

responses were reported as crude and standardized (average response percentages).

Instrument validity was determined through content validity. Based on expertise, the questionnaires were distributed to 10 professors of the Medical-Surgical Nursing Department, Faculty of Nursing, Shahid Beheshti University of Medical Sciences, and their opinions were reviewed and acceptable points were applied. In order to determine the reliability of the questionnaires, the test-retest method (pre-test and post-test) was used and the correlation between responses was measured. Also, Cronbach's alpha was calculated to determine the internal correlation of the questionnaire, which was 0.72. In this research, after obtaining the code of ethics from the ethics committee of the Faculty of Nursing and Midwifery of Shahid Beheshti University of Medical Sciences in Tehran with No. IR.SBMU.PHNM.1396.699, and after reviewing the inclusion criteria, the questionnaires were distributed among Students and then collected. In order to analyze the data, descriptive statistics were used to calculate mean scores and standard deviations for each scenario and each academic year separately. Percentage taking method was used due to the variety in the number of correct answers for each scenario, and to make the results homogeneous. The total number of correct answers in the scenarios for the first year was 74 cases, for the second year 77 cases and for the third year 106 cases. The Shapiro Wilk test was used to measure the normal distribution of the variables under study. Regarding the normal or abnormal distribution of variables under study, parametric analysis of "variance analysis" and non-parametric "Friedman test" were used. In order to determine the significant difference between the groups under study invariance analysis, the author used the Tamhin follow-up test.

RESULTS

Among 150 nursing students participating in the study, 102 subjects (68%) were female and 48 subjects (32%) were male. First-year students were 50 subjects, second-year students were 50 subjects and third-year students were 50 subjects. In order to facilitate the discussion of students points, and considering the common classification for exam scores (A, B, C, D), the scores above 85% were considered good, between 60% and 70% as moderate, between 50% and 60% weak, and below 50% very weak.

The first-year students responded to 3 scenarios of patients diagnosed with appendicitis, femoral fractures, and peptic ulcers. Based on the results, the clinical reasoning skill in the first year was poor ($51.59 \pm 0.06\%$) (Table 1).

Second-year students responded to 3 scenarios related to patients with acute coronary insufficiency, oliguria, and pulmonary edema. The results indicated that the clinical reasoning skill of second-year students was very weak ($48.41 \pm 0.09\%$) (Table 2).

Third-year students responded to 3 scenarios related to patients with anemia, diabetes, and meningitis. The results indicated that the level of clinical reasoning skill in third-year students was very weak (37.62 ± 0.88) (Table 3).

The mean of total scores and standardized scores of all students under study indicated that the level of clinical reasoning skills of nursing students in Shahid Beheshti University of Medical Sciences was very weak (Table 4). The results of the follow-up test indicated that there was no significant difference between the scores of first and second-year students, but there was a significant difference between the scores of the third-year students in each of the first and second years (Table 5).

Table 1. Clinical Reasoning Skills of First-Year Nursing Students of Shahid Beheshti University of Medical Sciences in each of the Scenarios (Appendicitis, Femoral Fractures, Peptic Ulcers) and in Total 3 Scenarios

Scenarios/Answers	The Average Percentage of the Total Score	The Total Number of Correct Answers	Maximum Score	Minimum Score	Average Score
Assessment, Diagnosis, Planning, Implementation (Appendicitis)	0.10 ± 51.64	28	18	6	2.24 ± 11.36
Femoral fracture	52.07 ± 0.08	28	20	9	14.58 ± 2.46
Peptic ulcer	51 ± 0.08	24	16	7	12.24 ± 2.12
Appendicitis/Femoral fracture/Peptic ulcer	51.59 ± 0.06	74	50	24	38.18 ± 5.00

Table 2. Clinical Reasoning Skills of Second-Year Nursing Students of Shahid Beheshti University of Medical Sciences in each of the Scenarios (ACS, Oliguria, Pulmonary Edema) and in Total 3 Scenarios.

Scenarios/ Answers	The Average Percentage of the Total Score	The Total Number of Correct Answers	Maximum Score	Minimum Score	Average Score
Assessment, Diagnosis, Planning, Implementation (ACS)	51.87 ± 0.12	31	24	11	16.08 ± 4.01
Oliguria	46.86 ± 0.10	21	14	6	9.84 ± 2.27
Pulmonary edema	46.64 ± 0.11	25	18	6	11.66 ± 0.11
ACS/ oliguria/ pulmonary edema	48.41 ± 0.09	77	50	24	37.58 ± 7.44

Table 3. Clinical Reasoning Skills of Third-Year Nursing Students of Shahid Beheshti University of Medical Sciences in each of the scenarios (Anemia, Diabetes, Meningitis) and in Total 3 Scenarios.

Scenarios/ Answers	The Average Percentage of the Total Score	The Total Number of Correct Answers	Maximum Score	Minimum Score	Average Score
Assessment, Diagnosis, Planning, Implementation (Anemia)	39.90±0.09	33	21	7	12.9±3.24
Diabetes	36.94±0.11	32	20	6	11.82±3.76
Meningitis	36.98±0.12	41	25	6	15.16±5.03
Anemia/ Diabetes / Meningitis	37.62±0.08	106	64	25	39.88±9.19

Table4. Average Total Scores of Nursing Students of Shahid Beheshti University of Medical Sciences in Tehran

Students/ Indicators	True (Out of 257)	Minimum Score	Maximum Score	The Average Percentage of the Total Score
First, second and third-year students	115.64±17.16	79	143	46.01±0.10

Table5. Tamhin Follow up Test (Dependent Variable Tukey HSD)

(I) Index1	(J)	Mean Difference (I-J)	Std. Error	Sig	95% Confidence Interval	
Index1					Lower Bound	Upper Bound
2	1	0.02789	0.01684	0.226	-0.0120	0.0678
3	1	0.14669 [*]	0.01684	0.000	0.1068	0.1866
3	2	-0.02789	0.01684	0.226	-0.0678	0.0120
1	3	0.11879 [*]	0.01684	0.000	0.0789	0.1587
1	2	-0.14669 [*]	0.01684	0.000	-0.1866	-0.1068
2	3	-0.11879 [*]	0.01684	0.000	-0.1587	-0.0789

*The mean difference is significant at the 0.05 level.

DISCUSSION

Based on the results of the present study, the level of clinical reasoning skills of students in the first year was weak and very weak for the second and third years. The results also indicated that the students' clinical reasoning skill level had a decline from the first to the third year. The results of the Tamhin follow up test indicated that there was no significant difference between the scores obtained from the first and second-year students. But there was a significant difference between the scores of the third-year students and the first and second-year students, which indicated that the more we get close from the first year to the third three, the students' clinical reasoning skills will be weaker. First-year students performed better in the femoral fracture scenario, second-year students in the ACS scenario, and third-year students performed better in the anemia scenario. It seems that students in the clinical environment have encountered more patients with these three cases. The weakest response was related to the meningitis scenario. It seems that the low visit of students with clinical cases of meningitis has led to very poor reasoning for third-year students. Educators should arrange for students to visit all cases and illnesses in the hospital, see less common illnesses in the hospital, and challenge their thinking, reasoning, and judgment about them. In a study conducted by Thom Nann et al. in 2018 entitled "The Status of Critical Thinking at Undergraduate Nursing Students" in Ireland with aimed at investigating the critical thinking states and the

differences between the first and third-year nursing students, it was found that the first-year students' critical thinking was higher than the third-year students [22]. Which is consistent with our research findings. Students seem to be more inclined to do clinical work overtime than to think and reason about the patient's condition. Mohsen Adib Bagheri et al., in an investigation in 2015 on the critical thinking skills of nursing students, found that students in higher years get involved with routine and technical work, which do not need to think and is more in line with fulfilling the physician's order, they have a lower critical thinking skill than those in the lower years. They also concluded that routine work had an effect on their thinking, and leads to a decline in their critical thinking skills. Adib Bagheri et al. also found that the critical thinking skills of students did not change with increasing educational levels [23]. This finding is consistent with our research findings. Following the doctor's instructions causes students to have no place for thinking and reasoning, and nursing instructors do not offer appropriate solutions in this regard. In a study conducted by Mirmolai et al. in 2004 aimed at comparing the critical thinking of the first and last semester undergraduate students in Tehran's medical universities, they found that the level of students' critical thinking skills in the first semester was low [18]. This is consistent with our findings from freshmen, But Mirmolai did not specify whether senior students think higher than freshmen. In a study on the effect of patient-centered participatory training on nursing process scores and critical thinking of nursing trainees in the fifth

semester, Nouri and Abbaszadeh (2013) concluded that the critical thinking ability of fifth-semester students was weak [24]. Ramezani Badr and Shaban in a study conducted in Tehran University of Medical Sciences in 2009 entitled "The Clinical Decision-Making Skill of the Last Year Nursing Students in Tehran University of Medical Sciences" also noted the weakness of clinical decision-making skills among the last year students of this university [25]. Also, Pariad et al. (2011) conducted a study to determine the relationship between critical thinking and clinical decision making among nursing students at Gilan University of Medical Sciences in 2011, who indicated a weakness of critical thinking in the last year students of the university [26]. Most studies show the weakness of first year students' clinical reasoning skills. But few studies have shown what level of reasoning students can achieve as they enter higher education semesters.

CONCLUSIONS

The findings also indicated that the students' clinical reasoning had a decline from the first year to the third year, and is generally at a very weak level. Since by entering the higher educational years, the students gain the ability to have a part-time and sometimes full-time job in health centers, it is likely that they get to engage in routine and technical clinical interventions and more often follow the orders of the physician and less often refer to their thinking to solve problems, which can lead to a decline in the students' critical thinking skill and clinical reasoning and judgment, while moving to higher years. Apparently, the current teaching methods have failed to improve the students' thinking and reasoning skills. Therefore, revising the teaching methods can solve this problem, and reduce the gap between the theoretical teaching and its application in the clinic. The nursing students' educational curriculum does not

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mention the evaluation of clinical reasoning skills. Also, instructors and professors do not have enough planning in this regard to use the common principles of assessing clinical reasoning skills in students. Tools like Kfp can help trainers assess this skill. Since the current teaching methods have not been successful in improving the level of thinking and reasoning skills of students, the need to review teaching methods can be a solution to this problem. Also, the gap between teaching theory and its application in clinical practice can be mentioned. And the findings of the present study can be used in planning to close this gap.

Also, clinical education should be student-centered so that the student can use theoretical learning to think and reason in the clinical environment and achieve a correct judgment of the patient's condition.

Research Limitation

Gathering students every year inside a classroom was difficult and forced sampling was done in several stages.

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Ethical Considerations

The samples participating in this study are completely voluntary and with written consent.

Conflict of Interest

There is No conflicts of interest for this study.

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Author's Contributions

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