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Diagnostic thinking and its association with clinical competence among Iranian nurses in emergency departments

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Abstract

Background: Diagnostic thinking and clinical competence are the two main domains of efficient nursing care. This study assessed the association between diagnostic thinking and clinical competence among emergency nurses.

Methods: The present correlation study was conducted in 2020 on 113 nurses working in emergency departments in a northwestern province of Iran over two consecutive years. A stratified random sampling method was used for recruiting nurses. Data was gathered via a demographic questionnaire, the Diagnostic Thinking Inventory, and the Nurse Competence Scale and analyzed using the SPSS 18 software. Pearson's correlation assessed the association between the nurses' diagnostic thinking and clinical competence at a significance level of 0.05.

Results: According to the findings, the nurses' diagnostic thinking abilities were poor (154.15 ±15.73, range of 150-155), while their clinical competence was good (61.62±18.97, range of 51-75). Significant correlations emerged between thinking flexibility, work role (r=0.22, p=0.017), and memory structure. In addition, thinking flexibility was significantly associated with work role (r=0.22, P=0.017), and memory structure was correlated with teaching-coaching function (r=0.22, P=0.015), diagnostic functions (r=0.25, P=0.006), management of situations (r=0.45, P=0.0001), therapeutic interventions (r=0.42, P=0.0001), regimens (r=0.18, P=0.056), and work role (r=0.4, P=0.0001).

Conclusion: Amplifying thinking procedures and using diagnostic thinking patterns enhance emergency nurses' practice, performance, and clinical competence and promote nursing care. Lecturers and planners must employ modern educational methods to increase nurses' thinking skills and clinical competence.

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Highlights

What is current knowledge?

- Diagnostic thinking and clinical competence are crucial for delivering efficient nursing care.
- Diagnostic thinking is a cognitive process leading to an accurate decision.

What is new here?

- While nurses displayed poor diagnostic thinking abilities, their clinical competence was rated as good.
- Significant correlations were identified between various components of diagnostic thinking (Such as thinking flexibility and memory structure) and specific aspects of clinical competence (Such as work role, teaching-coaching function, and management of situations).
- These results underscore the complexity of the interplay between cognitive and practical skills in emergency nursing.
- They suggest targeted areas for enhancing both diagnostic thinking and clinical competence.

Introduction

Nursing has been introduced as an independent career in the medical community (1). Nursing combines knowledge, practice, thinking, value, philosophy, commitment, activity, and passion to care for patients and disabled persons (2). Nurses are an essential communication link between patients and the treatment system (3). With the help of knowledge, thinking, and the power of reasoning, nurses can assess patients' problems. They can also reach potential solutions to these problems by managing time, power, and required resources, gaining clinical experience in a critical situation, receiving colleague support, and reinforcing their knowledge and skills. Eventually, with logic and creative thinking, nurses can make precise decisions and administrate appropriate treatments (4). The concept of critical thinking has been widely used in multiple fields, especially nursing. Individuals who think critically strive to create and preserve the practices of reasoning and judgment (5). A study indicated that advanced practitioners with critical thinking skills demonstrated enhanced diagnostic capabilities in emergency environments (6).

Diagnostic thinking is a cognitive process that leads to accurate decisions. This targeted, logic-oriented, and outcome-oriented process addresses various factors, including the patient's physical disorders and disabilities (7). Diagnostic thinking relies on rich and distinct knowledge to create mental models of symptoms and findings, leading to a systematic diagnosis (8). In clinical departments of hospitals, the process of diagnostic thinking is unintentionally implemented. The emergency department is a challenging environment where nurses deal with patients with severe physical and mental issues who require appropriate examinations, treatments, and care measures. In such situations, emergency nurses must make quick decisions and follow only some nursing process steps for implementing caring measures. Therefore, they rely on empirical knowledge and the specific symptoms of diseases to make emergency decisions. In this regard, employing diagnostic thinking may significantly affect reaching accurate decisions (9). A study in Japan showed that medical students' diagnostic thinking status was weak, and they had difficulty reaching precise decisions in the scenarios proposed (10). In another study in Taiwan, nurses' level of critical thinking was moderate. The highest score was for interpretation abilities, and the lowest was for deduction abilities (11). Similarly, in Akbari et al.'s study in 2022, medical students' level of diagnostic thinking was reported as weak, with a total score of 151.4 (12). In Iran, findings regarding diagnostic thinking are limited and are mainly related to judgment and clinical decision-making (13).

Clinical competence is a fundamental concept that significantly impacts patient service and care. It is an individual's potency and actual action for performing a particular role in a specific clinical situation (14). In this setting, competence is the creation of new rules, reasoning procedures, and integrating skills, values, knowledge, and attitudes to specific and contextual practice situations (15). Benner identified the stages of competence acquisition in nursing: novice, advanced beginner, competent, proficient, and expert (16). According to Benner, nursing competence has seven domains: the helping role, the teaching-coaching function, the diagnostic and patient monitoring function, effective management of rapidly changing situations, administering and monitoring therapeutic interventions and regimens, monitoring and ensuring the quality of health care practices, and organizational and work-role competencies (17). The emergency department, where nurses encounter many challenges, is crucial in acquiring clinical nursing competence. In one study, Canadian nurses reported inadequate access to resources to support disaster response capacity and expressed a low degree of confidence in the preparedness of Canadian healthcare institutions (18). Additionally, in a study in Taiwan, nurses' clinical competence was moderate. The highest score for the subscales was for 'caring ability,' and the lowest was for 'research ability' (11). A study in Iran also showed that the clinical competence of emergency nurses was not satisfactory, and most nurses made drug-prescribing mistakes (19). In another study, nurses had the lowest level of

competence in "education and advisement" and "quality assurance" skills and the highest level of competence in "management settings" (20).

Emergency nurses' level of clinical competence is related to their critical thinking level (11). Thus, tiredness, long working hours, and drastic shifts may affect their decisions in emergency settings. Since Iranian emergency nurses' level of diagnostic thinking has not yet been assessed, the present study was designed to assess the status and association of diagnostic thinking and clinical competence among nurses of emergency departments in a northwestern province of Iran.

Methods

The present correlation-descriptive study examined the relationship between diagnostic thinking and clinical competence among emergency nurses working in teaching hospitals in a northwestern province of Iran in 2020.

The study participants were 130 nurses working in emergency departments, who were selected using the stratified random sampling method. In this regard, the researcher visited the emergency departments of teaching hospitals at different shifts, introduced herself, and described the research objectives. After gaining permission, the participants were randomly recruited based on the number of nurses working in the emergency departments. Written informed consent was completed for all participants, and data confidentiality was ensured.

Inclusion criteria were having a minimum of six months of clinical experience in emergency departments, having a bachelor's or master's degree education level, working at one of the sections of the emergency department as rotational shiftwork or fixed shifts, and having a direct and persistent relationship with patients. Exclusion criteria were not answering more than 20% of the items of the questionnaires and being unwilling to participate in the study at any level. Overall, 17 individuals dropped out of the study due to missing or incomplete data.

The setting was the emergency departments of teaching hospitals affiliated with the Tabriz University of Medical Sciences. After requisite coordination, the researcher visited the hospitals 30 minutes before the commencement of morning, afternoon, and night shifts, and she introduced herself and explained the research aims. The questionnaires were described to the participants, written informed consent was completed, and data confidentiality was ensured. To calculate the sample size, a pilot study was first performed on 30 nurses working in emergency departments. Considering the correlation coefficient of 0 and 1 between the descriptive thinking score and emergency nurses' clinical competence, 5% first bias, 90% power, > 0.3 correlation between variables, the possibility of dropout, and the total community sample size (Total number of nurses working in emergency departments of teaching hospitals affiliated with the Tabriz University of Medical Sciences), the sample size of the current study was demonstrated to be 113 nurses.

To calculate the sample size, the parameters are defined as follows: $z\alpha$ represents the critical value of the standard normal distribution corresponding to the significance level α, which is used to determine the confidence level of the study, and $z1\text{-}\beta$ denotes the critical value of the standard normal distribution associated with the power of the study, where β is the probability of Type II error (The risk of failing to detect an effect that is present). The term r stands for the effect size, which measures the strength of the relationship between variables or the magnitude of the difference between groups. The natural logarithm function in transforms the effect size into the log-odds ratio. The constant 4 ensures the correct scaling of the sample size, and adding 3 is an adjustment factor to account for specific design or sampling considerations.

The standard normal deviate for α (Zα) was 1.9600, and the standard normal deviate for β (Zβ) was 1.2816. Additionally, C was equal to 0.3095. The total estimated sample size was 113 participants.

Data was gathered from January to June 2020 using a demographic questionnaire, the Diagnostic Thinking Inventory (DTI), and the Nurse Competence Scale (NCS).

The Diagnostic Thinking Inventory (DTI), developed by Bordage et al. in 1990, assesses two critical cognitive elements: the structure of memory and the adaptability of thought processes. It consists of 41 items rated on a 6-point Likert scale. The DTI's scoring system is structured into two main sections: The Memory Structure section, comprising 20 items, measures a nurse's capacity to access and apply stored knowledge in clinical contexts, with a maximum score of 120. The Flexibility in thinking section, with 21 items, gauges the nurse's ability to employ diverse cognitive strategies in diagnostic scenarios, with a maximum score of 246. The overall DTI score classifies diagnostic thinking into five distinct levels. Level 1 (DTI=150-155) indicates a nurse with restricted flexibility and a less structured memory. Level 2 (DTI=156-160) shows a modest enhancement in both flexibility and memory structure. Level 3 (DTI=161-165) signifies a significant improvement in these areas. Level 4 (DTI=166-170) indicates good flexibility and a robustly structured memory. The highest level, level 5 (DTI=171-246), signifies exceptional flexibility and a highly structured memory. These levels together offer a thorough evaluation of a nurse's diagnostic thinking skills. (21,22)

The NCS, developed by Meretoja and colleagues in 2004, is based on Benner's competence framework. It enables nurses to self-assess their performance, gain insights into their practice, and identify development opportunities. The NCS evaluates 73 nursing skills categorized into seven distinct domains. The helping role domain, with seven skills, measures a nurse's commitment to healing. The teaching-coaching function encompasses 16 skills and assesses the nurse's ability to educate and empower patients effectively. Diagnostic functions involve seven skills that evaluate the nurse's recognition and documentation of significant changes in patient status. Managing situations, including eight skills, test the nurse's ability to handle emergencies and interventions. The therapeutic interventions domain, with 10 skills, gauges the nurse's proficiency in procedures and medication administration. Ensuring quality includes six skills that check for safe nursing and therapeutic practices. Lastly, work-role competencies cover 19 skills and measure the nurse's ability to coordinate patient needs, prioritize tasks, and manage a healthcare team. Nurses evaluate the frequency of their skill usage in clinical practice using a four-point scale, where 0 indicates 'not applicable,' 1 signifies 'used very seldom,' 2 means 'used occasionally,' and 3 represents 'used very often.' In addition, they assess their competence level for each skill on a scale ranging from 0 to 100. These self-evaluated competence levels are then classified on a Visual Analogue Scale (VAS) with the following categories: low VAS for scores between 0-25, quite good VAS for scores between 26-50, good VAS for scores between 51-75, and very good VAS for scores between 76-100 (23).

The researcher translated the questionnaires, and experts approved their accuracy via reverse translation. The academic staff of the university approved the validity of the questionnaires. The Alpha-Cronbach test was used to assess the reliability and internal coherence of the questionnaires. Also, the intra-class correlation coefficient was used for assessing reliability between appraisers. Based on the findings, the Alpha-Cronbach was 0.659 for the diagnostic thinking questionnaire and 0.783 for the clinical competence questionnaire, which was considered acceptable. In Iran, the NCS was utilized in Hassankhani et al.'s study (2017) (24), and the DTI was employed in Kashmiri et al.'s study (2022) (25).

The statistical analyses were conducted using SPSS version 18 (SPSS Inc., Chicago, IL, USA). The normality of the data distribution was assessed using the Kolmogorov-Smirnov test. The selection of these statistical tests was based on the nature of the data and the study's specific objectives. Descriptive statistics, such as mean and standard deviation, were employed for the initial data evaluation. Pearson's correlation coefficient was calculated to investigate the relationship between the nurses' diagnostic thinking and clinical competence, with the significance level set at 0.05.

Results

Among the total participants of the present study, 57.53% were female nurses, and 43.4% had work experience of 6 months to 5 years. Also, 48 nurses were in the 26-30 years age range, 93 nurses had bachelor's degrees, and 20 nurses had master's degrees.

According to the findings, the nurses' diagnostic thinking abilities were poor (154.15±15.73, range of 150-155), while their clinical competence was good (61.62±18.97, range of 51-75). Significant correlations emerged between thinking flexibility, work role (r=0.22, p=0.017), and memory structure. In addition, thinking flexibility was significantly associated with work role (r=0.22, P=0.017), and memory structure was correlated with teaching-coaching function (r=0.22, P=0.015), diagnostic functions (r=0.25, P=0.006), management of situations (r=0.45, P=0.0001), therapeutic interventions (r=0.42, P=0.0001), and regimens (r=0.18, P=0.056), and work role (r=0.4, P=0.0001).

Based on Table 1 and the DTI tool scoring protocol, the mean thinking flexibility score was 77.06 out of 126, and the mean memory structure score was 77.08 out of 120. The emergency nurses' level of diagnostic thinking yielded a total score of 154.15, which was in the first level, indicating weak flexibility and memory structure. Moreover, the emergency nurses' clinical competence yielded a score of 61.62, which was in the acceptable range. Table 2 shows the frequency of practice used in clinical practice. Based on Table 2, of the participants, 37.11% reported 'using very often in my work,' 37.2% reported 'using occasionally,' 19.9% reported 'using very seldom,' and 5.6% reported 'never using.' The results of assessing the emergency nurses' clinical competence showed a positive association between the clinical competence level of the 73-item scale and practice settings. The highest level of clinical competence was 'used occasionally. According to Table 3, the highest score (67.42) was related to managing situations, while the lowest score (52.63) was associated with quality assurance.

Table 1. Diagnostic thinking of emergency nurses in teaching hospitals

Domains of diagnostic thinking	Number of items	Range of scores for each domain	Mean ± Standard deviation
Thinking flexibility	21	21_126	77.06±7.94
Memory structure	20	20_120	77.08±10.93
Total	41	41_226	154.15±15.73

Table 2. Frequency and percent of using clinical competence skills by emergency nurses

Domains of clinical competence	Never N (%)	Seldom N (%)	Occasionally N (%)	Very often N (%)
Humanism role	43 (5.44)	179 (22.62)	304 (38.44)	265 (33.50)
Teaching-coaching	131 (7.25)	390 (21.57)	643 (35.56)	644 (35.62)
Diagnostic functions	46 (5.82)	165 (20.86)	270 (34.13)	310 (39.19)
Managing situations	23 (2.55)	132 (14.60)	342 (37.83)	407 (45.02)
Therapeutic interventions	64 (5.66)	219 (19.39)	417 (36.90)	430 (38.05)
Ensuring quality	55 (8.11)	187 (27.59)	270 (39.82)	166 (24.48)
Work role	100 (4.66)	377 (17.56)	830 (38.66)	840 (39.12)
All skills	462 (5.61)	1649 (19.99)	3076 (37.28)	3062 (37.12)

Table 3. Nurses' clinical competence in emergency departments

Domains of clinical competence	Number of items for each domain	Mean ± Standard deviation
Humanism role	7	59.25±20.34
Teaching-coaching	16	60.8±20.75
Diagnostic functions	7	61.2±22.29
Managing situations	8	67.42±18.04
Therapeutic interventions	10	62.7±21.06
Ensuring quality	6	52.63±23.78
Work role	19	63.17±18.71
Total	73	61.62±18.97

As shown in Table 4, the Pearson correlation coefficient was used to assess the relationship between the emergency nurses' diagnostic thinking level and their clinical competence. The results indicated a significant direct association between thinking flexibility with work role (r=0.22, p=0.017), and between memory structure with teaching-coaching function (r=0.22, P=0.015), diagnostic functions (r=0.25, P=0.006), management of situations (r=0.45, P=0.0001), therapeutic interventions (r=0.42, P=0.0001), regimens (r=0.18, P=0.056), and work role (r=0.4, P=0.0001).

Table 4. The Pearson correlation between diagnostic thinking and clinical competence of emergency nurses

Variables	Humanism role	Teaching-coaching	Diagnostic functions	Managing situations	Therapeutic interventions	Ensuring quality	Work role
Thinking flexibility	r=0.072 P=0.450	r=0.127 P=0.178	r=0.100 P=0.294	r=0.066 P=0.489	r=0.167 P=0.077	r=-0.005 P=0.959	r=0.224 *P=0.017
Memory structure	r=0.162 P=0.087	r=0.229 *P=0.015	r=0.255 *P=0.006	r =0.459 *P=0.0001	r =0.424 *P=0.0001	r=0.181 P=0.056	r=0.4 *P=0.0001

*Statistically significant

Discussion

This study aimed to determine diagnostic thinking and its association with clinical competence among Iranian nurses in emergency departments. The diagnostic thinking scores indicated weak flexibility and memory structure, while the clinical competence scores were rated as good. The highest competence was in managing situations, and the lowest was in quality assurance. The frequency of practice showed a positive association between clinical competence levels, with 'occasional use' scoring the highest.

In the current study, the emergency nurses' total diagnostic thinking score was 154.15, rated as level 1 and weak based on the DTI scoring protocol. Our findings are in line with the findings of Akbari et al. (2022), who reported weak diagnostic thinking with a score of 151.4 in medical students (26). Similarly, Owlia et al. (2022) stated weak diagnostic thinking among dentistry students with a score of 136.47 (12). In our study, the diagnostic thinking practice was higher among emergency nurses aged 31-35 years, those with 11-15 years of work experience, and female. Moreover, the mean diagnostic thinking score was higher among nurses with bachelor's degrees than those with master's degrees. The nurses' mean diagnostic thinking score was 77.06 out of 126 in the thinking flexibility item and 77.08 out of 120 in the memory structure item, with both scores being nearly similar. These findings indicate that the nurses' practices in the domains of diagnostic thinking and memory structure are similar and that they use both practices for making decisions. In Owlia et al.'s study, there was a significant difference between the mean scores of diagnostic thinking and memory structure. Also, they reported that dentistry students' action practices were stronger than their thinking practices (12). In a comparable study conducted in southwestern Vietnam, most participants exhibited either a low or moderate level of critical thinking skills (27).

In the present study, the mean score of the emergency nurses' clinical competence was 61.62, with 18.97 standard deviations, which was demonstrated as a good level. The results of our study are in line with the findings of Jalalian et al. (2023) (28) and Salameh et al. (2023) (29). In Shahbazi et al.'s study (2020), nurses' self-reported clinical competence was moderate (30). In this study, the highest score (67.42) for clinical competence was related to managing situations, showing that emergency nurses deal with patients with difficult situations and require high managing skills for making urgent decisions. They reported the lowest score (52.63) in relation to quality assurance, which could be due to the lack of knowledge in this field and the absence of required resources. In Hassankhani et al.'s study, emergency nurses self-reported their highest levels of clinical competence in work role and the monitoring function, while their lowest levels were in managing situations and therapeutic interventions (24). Similar to our findings, Mahreini et al. claimed that nurses had the highest level of clinical competence in managing situations but the lowest levels in ensuring the quality and teaching-coaching functions (20). In Adib et al.'s study (2018), the highest level of clinical competence was associated with the effective management of rapidly changing situations, while the lowest level was related to ensuring the quality of healthcare practices (31).

Concerning the frequency of practice used in clinical practice, there was a positive association between the level of clinical competence of the 73-item scale and practice settings. The highest level of clinical competence was for practices 'used occasionally.' Our results are similar to the findings of previous studies, indicating an increased frequency of applying practices and an enhanced mean score of clinical competence among emergency nurses (32,33). Assessing the relationship between diagnostic thinking and clinical competence showed a significant direct association between thinking flexibility and work role, as well as between memory structure and teaching-coaching function, diagnostic functions, management of situations, therapeutic interventions, regimens, and work role. Our study aligns with Mei Jen Chang et al.'s study, which showed a significant direct association between nurses' critical thinking skills and their clinical competence. They found that enhancing the nurses' clinical competence practices improved their critical thinking skills. Moreover, their study revealed that increased work experience, higher occupational status, and greater educational levels were associated with enhanced clinical competence and critical thinking skills among nurses (34). In a similar vein, Chen et al. (2020) proposed a significantly positive association between critical thinking and clinical competence among nurses (35). Similarly, Orujlu and Hemmati (2015) reported a significantly positive association between critical thinking and self-efficiency among nursing students (36). Furthermore, Yu and colleagues showed a statistically significant and positive association between the total score of clinical competence and clinical self-efficiency among nursing students (37). However, one study did not observe any statistically significant association between nurses' critical thinking and clinical decision-making in intensive care units. Nonetheless, the mean score of clinical decision-making was statistically significantly related to work experience, age, and year of graduation (38).

This study underscores the importance of diagnostic thinking in enhancing clinical competence. It suggests that while emergency nurses demonstrate strong management skills in critical situations, they need to improve their diagnostic thinking abilities to ensure comprehensive and quality patient care. The association between diagnostic thinking and clinical competence is evident, and it is imperative to address the identified gaps to further strengthen emergency nursing practice.

The limitations of this study included the large number of items in the questionnaires, sampling conducted during the COVID-19 pandemic, language boundaries as the questionnaires were in Farsi while the nurses' native language was Azari, and the use of self-assessment for evaluating the nurses' clinical competence. The nurses may have provided unreal scores during self-assessment, which could have reduced the evaluation accuracy. Despite the limitations of self-assessment, we believe that trusting nurses to use self-assessment can help them improve their diagnosis thinking and clinical competence, thereby enhancing the quality of their services.

Conclusion

The results showed a statistically significant and direct association between diagnostic thinking and some clinical competence domains. According to the findings, diagnostic thinking practices should be assessed in senior nursing students.

The current study's findings may be used for better management in clinical wards. We can conclude that educational executives of nursing schools, managers, supervisors, and matrons of wards, especially emergency head nurses, should take critical steps in amplifying reasoning, judgment, thinking skills, and clinical competence in nursing students and nurses. Hence, lecturers and plan-makers are expected to use suitable educational methods for upgrading thinking abilities and clinical competence practices. Such education should be administered by implementing problem-solving approaches, holding cyclic seminars, and using other modern educational methods.

Future research should assess diagnostic thinking practices in senior nursing students and conduct evaluations in more diverse settings with larger sample sizes. Additional variables, such as self-confidence, should also be considered to gain a comprehensive understanding of the factors influencing clinical competence and diagnostic thinking in nursing.

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Ethical statement

For ethical considerations, appropriate consent was obtained from the research deputy and regional committee of ethics in research of the Tabriz University of Medical Sciences with the following ethical code: IR.TBZMED.REC.1399.1034.

Conflicts of interest

The authors declare no conflicts of interest.

Author contributions

FR and FJ designed the whole project and participated in data collection and interpretation. PS participated in interpreting data and statistical analysis. TB participated in data collection, translation of the scales, sampling, interpretation of data, and codification of the validity and reliability of scales.

References

1. Rosser E, Westcott L, Ali PA, Bosanquet J, Castro-Sanchez E, Dewing J, et al. The need for visible nursing leadership during COVID-19. J Nurs Scholarsh. 2020;52(5):459-61. [View at Publisher] [DOI] [PMID] [Google Scholar]
2. Potter PA, Perry AG, Stockert PA, Hall A. Fundamentals of nursing-e-book. Canada:Elsevier health sciences;2021. [View at Publisher] [Google Scholar]
3. Bos-van den Hoek DW, Thodé M, Jongerden IP, Van Laarhoven HW, Smets EM, Tange D, et al. The role of hospital nurses in shared decision-making about life-prolonging treatment: A qualitative interview study. J Adv Nurs. 2021;77(1):296-307. [View at Publisher] [DOI] [PMID] [Google Scholar]
4. James AH, Bennett CL. Effective nurse leadership in times of crisis. Nurs Manag (Harrow). 2020;27(4):32-40. [View at Publisher] [DOI] [PMID] [Google Scholar]
5. Berg C, Philipp R, Taff SD. Scoping review of critical thinking literature in healthcare education. Occup Ther Health Care. 2023;37(1):18-39. [View at Publisher] [DOI] [PMID] [Google Scholar]
6. McPhillips H, Wood AF, Harper-McDonald B. Critical thinking and diagnostic reasoning when advanced practitioners assess and treat skin conditions. Br J Nurs. 2021;30(22):1278-86. [View at Publisher] [DOI] [PMID] [Google Scholar]
7. Ramaswamy T, Sparling JL, Chang MG, Bittner EA. Ten misconceptions regarding decision-making in critical care. World J Crit Care Med. 2024;13(2):89644. [View at Publisher] [DOI] [PMID] [Google Scholar]
8. Brush JE, Sherbino J, Norman GR. Diagnostic reasoning in cardiovascular medicine. BMJ. 2022;376:e064389. [View at Publisher] [DOI] [PMID] [Google Scholar]
9. Al-Azri NH. How to think like an emergency care provider: a conceptual mental model for decision making in emergency care. Int J Emerg Med. 2020;13(1):17. [View at Publisher] [DOI] [PMID] [Google Scholar]
10. Noguchi Y, Matsui K, Imura H, Kiyota M, Fukui T. Quantitative evaluation of the diagnostic thinking process in medical students. J Gen Intern Med. 2002;17(11):839-44. [View at Publisher] [DOI] [PMID] [Google Scholar]
11. Chang MJ, Chang YJ, Kuo SH, Yang YH, Chou FH. Relationships between critical thinking ability and nursing competence in clinical nurses. J Clin Nurs. 2011;20(21-22):3224-32. [View at Publisher] [DOI] [PMID] [Google Scholar]
12. Owlia F, Keshmiri F, Kazemipoor M, Rashidi Maybodi F. Assessment of clinical reasoning and diagnostic thinking among dental students. Int J Dent. 2022;2022:1085326. [View at Publisher] [DOI] [PMID] [Google Scholar]
13. Lee CY, Jenq CC, Chandratilake M, Chen J, Chen MM, Nishigori H, et al. A scoping review of clinical reasoning research with Asian healthcare professionals. Adv Health Sci Educ Theory Pract. 2021;26(5):1555-79. [View at Publisher] [DOI] [PMID] [Google Scholar]
14. Almisnid KM. Assessment of Clinical Competence: Implementation of the Objective Structured Clinical Examination (OSCE) in Saudi Medical Schools: University of Leeds; 2023. [View at Publisher] [Google Scholar]
15. Kielo-Viljamaa E, Stolt M, Suhonen R, Eds. Wound Care Education in Nursing: A European Perspective. Switzerland: Springer; 2024. p.17-27. [View at Publisher] [DOI] [Google Scholar]
16. Rousse BS, Dreyfus SE. Teaching and Learning for Adult Skill Acquisition: Applying the Dreyfus and Dreyfus Model in Different Fields. Charlotte, NC, USA; 2021.[View at Publisher] [Google Scholar]
17. Øvrebø LJ, Dyrstad DN, Hansen BS. Assessment methods and tools to evaluate postgraduate critical care nursing students' competence in clinical placement. An integrative review. Nurse Educ Pract. 2022;58:103258. [View at Publisher] [DOI] [PMID] [Google Scholar]
18. O'Sullivan TL, Dow D, Turner MC, Lemyre L, Corneil W, Krewski D, et al. Disaster and emergency management: Canadian nurses' perceptions of preparedness on hospital front lines. Prehosp Disaster Med. 2008;23(3):s11-8. [View at Publisher] [DOI] [PMID] [Google Scholar]
19. Cheraghi MA, Nikbakhat Nasabadi AR, Mohammad Nejad E, Salari A, Ehsani Kouhi Kheyli SR. Medication errors among nurses in intensive care units (ICU). J Mazandaran Univ Med Sci. 2011;20(1):115-9. [View at Publisher] [Google Scholar]
20. Mahreini M, Moatary M, Akaberian S, Mirzaie K. Determining nurses' clinical competence in hospitals of Bushehr University of Medical Sciences by self-assessment method. Iran South Med J. 2008;11(1):69-75. [View at Publisher] [Google Scholar]
21. Kicklighter T, Barnum M, Geisler PR, Martin M. Validation of the quantitative diagnostic thinking inventory for athletic training: a pilot study. Athletic Training Education Journal. 2016;11(1):58-67. [View at Publisher] [DOI] [Google Scholar]
22. Rahayu GR, McAleer S. Clinical reasoning of Indonesian medical students as measured by diagnostic thinking inventory. South East Asian journal of medical education. 2008;2(1):42-7. [View at Publisher] [DOI] [Google Scholar]
23. Moss E. Examining the relationship between self-reported competence and caring efficacy in registered nurses 2018. [Dissertation] [View at Publisher] [Google Scholar]
24. Hassankhani H, Hasanzadeh F, Powers KA, Zadeh AD, Rajaie R. Clinical skills performed by Iranian emergency nurses: Perceived competency levels and attitudes toward expanding professional roles. J Emerg Nurs. 2018;44(2):156-63. [View at Publisher] [DOI] [PMID] [Google Scholar]
25. Keshmiri F, Owlia F, Kazemipoor M, Meybodi FR. Assessment of clinical reasoning and diagnostic thinking among dental students. 2021. [Preprint] [View at Publisher] [DOI] [Google Scholar]
26. Akbari R, Arabshahi S, Monajemi A. Evaluation of the Effect of Scenario writing on the Clinical Reasoning Ability of Medical Trainees in the Internal Rotation Using KF and DTI Methods. Medical Education Journal (mededj). 2022;10(2):91-104. [View at Publisher] [DOI] [Google Scholar]
27. Van Nguyen T, Liu HE. Factors associated with the critical thinking ability of professional nurses: A cross-sectional study. Nurs Open. 2021;8(4):1970-80. [View at Publisher] [DOI] [PMID] [Google Scholar]
28. Jalalian F, Hosseininejad SM, Montazer SH, Hesamzadeh A. Emergency Department Nurses' clinical competence and its related factors: A cross-sectional study. Asia Pacific Journal of Health Management. 2023;18(3):49-54. [View at Publisher] [DOI] [Google Scholar]
29. Salameh B, Amarneh DBS, Abdallah J, Ayed A, Hammad BM. Evaluation of clinical competence and job satisfaction and their related factors among emergency nurses in Palestinian hospitals. SAGE Open Nurs. 2023;9:23779608231208581. [View at Publisher] [DOI] [PMID] [Google Scholar]
30. Vand Tamadoni B, Shahbazi S, Seyedrasooli A, Gilani N, Gholizadeh L. A survey of clinical competence of new nurses working in emergency department in Iran: A descriptive, cross-sectional study. Nurs Open. 2020;7(6):1896-901. [View at Publisher] [DOI] [PMID] [Google Scholar]
31. Adib HM, Eshraghi AN. Assessing nurses' clinical competence from their own viewpoint and the viewpoint of head nurses: A descriptive study. Iran Journal of Nursing (IJN). 2018;31(111):52-64. [View at Publisher] [DOI] [Google Scholar]
32. AlRashedi HN, Alshammari B, AlOtaibi M, AlRashedi F, Alanazi N, AlOtaiby E, et al. Self-rated emergency core nursing competencies among emergency nurses in Qassim, Saudi Arabia. Cureus. 2022;14(12):e32416. [View at Publisher] [DOI] [PMID] [Google Scholar]
33. Zeydi AE, Ghazanfari MJ, Azizi E, Darvishi-Khezri H, Mortazavi H, Osuji J, et al. Clinical competence of Iranian nurses: A systematic review and meta-analysis. J Educ Health Promot. 2022;11(1):102. [View at Publisher] [DOI] [PMID] [Google Scholar]
34. Nabizadeh-Gharghozar Z, Alavi NM, Ajorpaz NM. Clinical competence in nursing: a hybrid concept analysis. Nurse Educ Today. 2021;97:104728. [View at Publisher] [DOI] [PMID] [Google Scholar]
35. Chen Q, Liu D, Zhou C, Tang S. Relationship between critical thinking disposition and research competence among clinical nurses: A cross-sectional study. Journal of Clinical Nursing. 2020;29(7-8):1332-40. [View at Publisher] [DOI] [PMID] [Google Scholar]
36. Orujlu S, Hemmati Maslakpak M. Assessing the relationship between critical thinking and self-efficacy of nursing student. Journal of Nursing Education. 2017;5(6):11-7. [View at Publisher] [DOI] [Google Scholar]
37. Yu M, Tong H, Li S, Wu XV, Hong J, Wang W. Clinical competence and its association with self-efficacy and clinical learning environments among Chinese undergraduate nursing students. Nurs Educ Pract. 2021;53:103055. [View at Publisher] [DOI] [PMID] [Google Scholar]
38. Salehi S, Bahrami M, Hosseini S, Akhondzadeh K. Critical thinking and clinical decision making in nurse. Iranian Journal of Nursing and Midwifery Research. 2008;12(1):13-6. [View at Publisher] [Google Scholar]

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