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Assessment of knowledge, attitudes, and performance of postgraduate nursing students regarding clinical reasoning and evidence-based nursing: a multicenter cross-sectional study in Iran

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Abstract

Background Within the realm of medical education, particularly in nursing, the paramount objective is to cultivate professionals who can make optimal clinical decisions through the integration of critical thinking skills, comprehensive knowledge, clinical reasoning, and evidence-based nursing practices. Given that these professional competencies constitute the cornerstone of effective healthcare delivery; their systematic development has become increasingly imperative. This study, therefore, aims to evaluate postgraduate nursing students' knowledge, attitudes, and performance regarding clinical reasoning and evidence-based nursing.

Methods A descriptive cross-sectional multicenter study was undertaken from September through November 2024. The study population comprised postgraduate nursing students from three medical sciences universities in Fars Province, Southern Iran. Through convenience sampling, 165 postgraduate nursing students were enrolled in the study. Data collection was accomplished using two validated questionnaires specifically designed to assess attitudes, knowledge, and performance in clinical reasoning and evidence-based nursing. The comprehensive assessment instrument incorporated three components for clinical reasoning: Clinical Reasoning Attitude (CR-A), Clinical Reasoning Knowledge (CR-K), and Clinical Reasoning Practice (CR-P). Additionally, it included three parallel components for evidence-based nursing: Evidence-Based Nursing Attitude (EBN-A), Evidence-Based Nursing Knowledge (EBN-K), and Evidence-Based Nursing Practice (EBN-P). Statistical analyses were performed using chi-square tests, Kolmogorov-Smirnov test, Pearson correlation coefficients, multiple linear regression with statistical significance established at $p < 0.05$. All analyses were conducted using SPSS version 25.

Results Of the 165 eligible postgraduate nursing students who participated in this study, 134 (81.2%) were master's degree students, and 31 (18.8%) were doctoral candidates. The mean age of the participants was 31.16 ± 5.25 years. Among the three components of clinical reasoning examined, the mean scores were 0.75 for CR-K, 0.88 for CR-A, and

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0.56 for CR-P, all of which fell within the satisfactory range. Similarly, the evidence-based nursing components yielded mean scores of 0.49 for EBN-K, 0.87 for EBN-A, and 0.55 for EBN-P, which, consistent with the clinical reasoning scores, were all within the satisfactory range. Furthermore, doctoral students demonstrated significantly higher mean scores across all components compared with master's students in both domains. The results of multiple linear regression models showed a direct and statistically significant relationship among evidence-based nursing practice (EBN-P), with Evidence-Based Nursing Attitude (EBN-A), $\beta = 0.462$, $p < 0.001$) and Evidence-Based Nursing knowledge (EBN-K), $\beta = 0.018$, $p < 0.001$) and Educational level ($\beta = 0.204$, $p < 0.05$). The results of multiple linear regression models showed a direct and statistically significant relationship between clinical reasoning practice (CR-P) with clinical reasoning knowledge(CR-K), $\beta = 0.164$, $p < 0.05$) and clinical reasoning attitude (CR-A), $\beta = 0.118$ $p < 0.001$) and Educational level ($\beta = 0.354$, $p < 0.001$).

Conclusion The findings of this empirical investigation revealed that postgraduate students across both master's and doctoral programs demonstrated exceptionally favorable mean scores in all three components of clinical reasoning and evidence-based nursing: knowledge, attitude, and practice. Of particular significance was the observation that doctoral students consistently achieved substantially higher mean scores across these components compared to their counterparts in master's programs. The findings from this investigation offer valuable implications for nursing education administrators in their ongoing efforts to enhance educational outcomes. These results provide a robust framework through which administrators can systematically evaluate nursing students' knowledge, attitudes, and performance in both clinical reasoning and evidence-based nursing practice.

Keywords Knowledge, Attitudes, Performance, Clinical reasoning, Evidence-based nursing, Nursing education

Introduction

While foundational knowledge and skills are essential in nursing education and training, particular emphasis must be placed on developing and enhancing clinical reasoning and diagnostic capabilities (1–2). One of the fundamental challenges confronting contemporary nursing education lies in students' capacity to translate theoretical knowledge into effective clinical decision-making and to implement evidence-based practices in patient care. This challenge stems from the substantial gap between theoretical classroom instruction and its practical application in clinical settings—a disparity that profoundly influences students' development of clinical reasoning capabilities [3]. The nursing profession inherently comprises two interconnected components: the theoretical foundation acquired through rigorous academic instruction, which constitutes the learners' comprehensive knowledge base, and the practical component, which focuses on the systematic development of clinical competencies [4]. It is through this inherent duality that the cultivation of competent nursing professionals demands equivalent emphasis on both theoretical and practical domains. While the theoretical framework serves as the essential underpinning for comprehending nursing practice in its entirety, the clinical environment proves instrumental in fostering experiential knowledge, refining practical skills, and developing sophisticated clinical reasoning competencies [5]. The imperative of ensuring that nursing students can effectively transpose their theoretical knowledge into clinical settings and formulate optimal patient care decisions must be systematically addressed throughout their educational trajectory [4]. Given that clinical reasoning proficiency constitutes one of the quintessential competencies expected of experienced and qualified nurses, it becomes imperative that nursing students develop robust clinical reasoning capabilities prior to their entry into the clinical domain [6]. Clinical reasoning encompasses a sophisticated cognitive process characterized by both dynamism and adaptability, enabling healthcare practitioners to comprehend patient conditions comprehensively and implement optimal interventions across diverse clinical scenarios, particularly in complex cases [7]. As the cognitive cornerstone of nursing practice, clinical reasoning underpins several critical professional competencies: clinical judgment, evidence-based decision-making, enhanced quality of care delivery, metacognitive awareness, and advanced professional capabilities. These interconnected elements collectively contribute to the advancement of nursing professionalization, continued professional development, and the establishment of professional autonomy (8–9). When practitioners demonstrate deficiencies in critical thinking and clinical reasoning proficiency, they may formulate inaccurate or scientifically unsound assessments of patients' clinical conditions—a limitation that potentially compromises patient safety and, in severe instances, contributes to adverse outcomes, including mortality (10–11). To effectively institutionalize and strengthen these essential critical thinking and clinical reasoning competencies among nursing professionals, it is imperative that they systematically incorporate both current scientific evidence and evidence-based nursing practices into their clinical decision-making processes [12].

Given the imperative for nurses to access current and authoritative information in making decisions about quality patient care delivery, it becomes paramount that they maintain comprehensive awareness of contemporary global scientific evidence within their field of practice. Furthermore, these healthcare professionals must develop sophisticated proficiency in implementing new and empirically validated findings in both patient management protocols and their daily clinical practice. This evidence-based approach enables nursing professionals to formulate scientifically sound and optimally effective decisions in patient care delivery, thereby ensuring the highest standards of clinical practice [9].

In contemporary healthcare, evidence-based education has emerged as the cornerstone for implementing the systematic, explicit, and judicious utilization of current evidence in clinical decision-making. Research in Evidence-Based Nursing (EBN) originated in the 1980s, with its primary focus directed toward clinical education [13]. Since its establishment in 1986, the National Institute for Nursing Research (NINR) has provided increasingly substantial support for nursing research in this domain [14]. Evidence-Based Nursing constitutes a comprehensive process through which nursing professionals formulate informed clinical decisions by synthesizing current research evidence with their clinical expertise [15]. This approach was specifically developed to support both healthcare providers and patients in making well-informed healthcare decisions within distinct clinical contexts [16].

As healthcare expenditures have escalated steadily, the emphasis on EBN has intensified commensurately (14–15). In their systematic review, "From Education and Clinical Practice to Evidence-Based Nursing," Mojaddadi et al. (2015) demonstrated that nursing professionals exhibit limited familiarity with evidence-based practice. Their findings indicated that practitioners require both specialized expertise and specific competencies to utilize evidence effectively in clinical settings [17]. Similarly, a study conducted by Mokhtari Nouri, et al. (2015), entitled "The Impact of Evidence-Based Nursing Guidelines Education on Nurses' Knowledge," revealed that the implementation of evidence-based care protocols proves instrumental in enhancing healthcare service quality, expanding the nursing knowledge base, and improving community health standards. Moreover, given that professional knowledge inevitably attenuates over time, there exists an ongoing imperative for continuous reinforcement and periodic review of material [18]. Building upon these findings, Azizi et al. (2022) underscore the critical importance of implementing active learning and teaching methodologies that incorporate nursing student participation, suggesting that such approaches foster enhanced adherence to evidence-based guidelines in clinical practice [19]. Dell'Aquila et al. (2021) further corroborate this finding by demonstrating that critical reflection on clinical evidence enhances both creativity and innovation while concurrently improving decision-making capabilities in clinical settings [20].

Given the paramount importance of cultivating clinical decision-making skills through evidence-based practice across all levels of nursing, nurses holding master's and doctoral degrees are uniquely positioned to drive this process forward in clinical settings. This critical aspect therefore merits heightened emphasis within nursing education curricula, particularly at the postgraduate level.

Nursing is a dynamic profession that routinely confronts unforeseen challenges in the care of patients with complex conditions. Practitioners who lack sufficient clinical reasoning skills in recognizing and diagnosing these conditions may struggle to deliver optimal patient care. The significance of clinical reasoning and evidence-based nursing in graduate education encompasses multiple dimensions, including the enhancement of care quality, development of critical thinking capabilities, and facilitation of scientific decision-making. These essential competencies enable practitioners to conduct more precise assessments of patient conditions through the application of best available evidence, thereby advancing patient safety outcomes. Moreover, mastery of these skills positions nurses to serve effectively as future educators, facilitating the transmission of knowledge to subsequent generations of practitioners. This comprehensive foundation not only promotes autonomous and confident practice in clinical settings but also contributes substantively to the advancement of nursing as a profession.

Despite the fundamental importance of clinical reasoning and evidence-based nursing in professional education, there remains a paucity of research examining nursing students' Knowledge, Attitude, and Practice (KAP) regarding these crucial components. Given that this topic has not been systematically investigated in Iran or other jurisdictions, and in light of both its significance and the existing research gap, this study was undertaken to examine the knowledge, attitudes, and practices of postgraduate nursing students regarding clinical reasoning and evidence-based nursing in southern Iran.

Methods

Study design, setting, and participants

This descriptive cross-sectional multicenter investigation examined the knowledge, attitudes, and practices regarding clinical reasoning and evidence-based nursing among postgraduate nursing students. The study was conducted from September through November 2024 across three nursing schools in Fars Province, southern Iran. Participants were required to meet three inclusion

criteria: expressing willingness to participate in the study, providing completed informed consent documentation, and having completed a minimum of one academic year in their respective programs. Exclusion criteria comprised the submission of incomplete or compromised questionnaires.

For participant recruitment, the principal investigator (ZM) visited the School of Nursing affiliated with the University of Medical Sciences in Fars Province, southern Iran, where eligible nursing students who met the inclusion criteria were invited to complete the questionnaires. Participant selection was conducted using convenience sampling. The required sample size was calculated at 205 participants, based on a Type I error rate of 0.05, statistical power of 90%, and a correlation coefficient of 0.27 from previous research [21]. Of the total sample approached, 165 participants completed and returned the questionnaires, yielding a response rate of 80.47%.

$$u = 1/2\ln\frac{(1+r)}{(1-r)}$$

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2}{u^2} + 3$$

Data collection instruments

Participant demographic information was obtained through a questionnaire capturing age, gender, and educational level. The primary assessment tool employed was the Clinical Reasoning and Evidence-Based Nursing Knowledge, Attitude, and Practice Assessment Questionnaire, which was developed and validated in Iran by Javdani Masrour [21]. This comprehensive instrument encompasses six distinct components: three for clinical reasoning (Clinical Reasoning Attitude [CR-A], Knowledge [CR-K], and Practice [CR-P]) and three parallel components for evidence-based nursing (Evidence-Based Nursing Attitude [EBN-A], Knowledge [EBN-K], and Practice [EBN-P]). Component scores are derived from the mean Likert score of constituent questions, with possible values ranging from −2 to +2. The aggregate assessment of clinical reasoning and evidence-based nursing status is determined through the combination of component scores, yielding a potential range of -6 to +6. Following initial development, the instrument underwent content validation by a panel of ten subject matter experts utilizing both Content Validity Index (CVI) and Content Validity Ratio (CVR) metrics, followed by reliability analysis for internal consistency and Confirmatory Factor Analysis (CFA) [21].

The questionnaire employs self-reported responses across three distinct assessment domains. Attitude items, prefaced with "In my opinion," utilize a five-point Likert scale ranging from "strongly disagree" (-2) to "strongly agree" (+2), with intermediary options of "disagree" (-1), "neutral" (0), and "agree" (+1). Knowledge assessment items, introduced by "How familiar are you/do you agree with the following statement," employ percentage-based responses from "approximately 0%" (-2) to "approximately 100%" (+2), with intermediate values at 25% (-1), 50% (0), and 75% (+1). Practice assessment items, beginning with "What percentage of time do you perform the following," utilize an identical percentage-based response scale.

The final validated instrument comprises 39 items, reduced from an initial pool of 60, each assessed on a five-point Likert scale. Internal consistency analysis yielded Cronbach's alpha coefficients as follows: CRA (0.84), CRK (0.76), CRP (0.76), EBN-A (0.84), EBN-K (0.91), and EBN-P (0.87). The aggregate Cronbach's alpha coefficients were 0.87 for clinical reasoning and 0.93 for the evidence-based nursing questionnaire. Item reduction from the initial version was guided by validity considerations and suboptimal internal consistency, determined through total item correlation using stepwise elimination to optimize Cronbach's alpha values.

The scoring framework employs a standardized mean Likert scale ranging from −2 to +2 for individual components, with qualitative classifications defined as follows: Very weak (-2 to -1.2), Weak (-1.2 to -0.4), Moderate (-0.4 to +0.4), Good (+0.4 to +1.2), and Very good (+1.2 to +2). The aggregate scores for both clinical reasoning and evidence-based nursing are calculated by summing their respective component scores, yielding a potential range of -6 to +6. These aggregate scores are classified according to the following criteria: Very weak (-6 to -3.6), Weak (-3.6 to -1.2), Moderate (-1.2 to +1.2), Good (+1.2 to +3.6), and Very good (+3.6 to +6).

Analysis of the clinical reasoning components revealed mean scores of 1.12 for Clinical Reasoning Attitude (classified as Good), -0.09 for Clinical Reasoning Knowledge (Moderate), and 0.33 for Clinical Reasoning Practice (Moderate). Similarly, examination of the evidence-based nursing components yielded mean scores of 0.85 for Evidence-Based Nursing Attitude (Good), -0.26 for Evidence-Based Nursing Knowledge (Moderate), and 0.23 for Evidence-Based Nursing Practice (Moderate). The aggregate scores were calculated at 1.14 for clinical reasoning and 0.78 for evidence-based nursing, both falling within the Moderate classification range. The Cronbach's α value in the present study was 0.89.

Data analysis

Kolmogorov Smirnov Test showed that the data had a normal distribution ($p < 0.05$). Statistical analyses were conducted utilizing Pearson correlation coefficients and chi-square tests, with the alpha level established at 0.05.

Table 1 Frequency distribution of the nursing students' demographics ($N=165$)

Variable		Number	Percentage
Age	< 30 years	110	66.66
	≥ 30 years	55	33.34
Gender	Male	71	43
	Female	94	57
Academic Semester	MSc	134	81.2
	PhD	31	18.8

MSc: Master of Science. PhD: Doctor of Philosophy

All statistical procedures were executed using SPSS version 25. Finally, multiple linear regression model with the backward technique to recognize evidence-based nursing practice (EBN-P), and clinical reasoning practice(CR-P) with independent associated factors.

Results

The study population comprised 165 eligible postgraduate nursing students, of whom 134 (81.2%) were pursuing master's degrees and 31 (18.8%) were doctoral candidates. The participants' mean age was 31.16 ± 5.25 years. Comprehensive demographic characteristics are presented in Table 1. With respect to clinical reasoning components, the analysis yielded mean scores of 0.75 for clinical reasoning knowledge (CR-K), 0.88 for clinical reasoning attitude (CR-A), and 0.56 for clinical reasoning practice (CR-P), all of which were situated within the satisfactory range. In parallel, the evidence-based nursing components exhibited mean scores of 0.49 for evidence-based nursing knowledge (EBN-K), 0.87 for evidence-based nursing attitude (EBN-A), and 0.55 for evidence-based nursing practice (EBN-P), which likewise fell within the satisfactory range (Table 2).

Upon examining the relationships between clinical reasoning components, evidence-based nursing, and demographic variables, the analyses revealed no significant correlation with age ($P>0.001$). Similarly, no significant associations were detected between these components and gender (Tables 3 and 4). However, educational level demonstrated significant associations with all components of both clinical reasoning and evidence-based

Table 2 Mean and standard deviation of KAP clinical reasoning and Evidence-Based nursing

KAP component		frequency	percent	Mean ± SD (Total)
Knowledge of clinical reasoning	Very weak	0	0	0.75 ± 0.56
	Weak	7	5.5	
	Moderate	48	29	
	Good	78	45.5	
	Very good	32	20	
Attitudes to clinical reasoning	Very weak	0	0	0.88 ± 0.51
	Weak	1	0.7	
	Moderate	24	14.5	
	Good	85	51.5	
	Very good	55	33.3	
Performance to clinical reasoning	Very weak	2	1.3	0.56 ± 0.71
	Weak	20	12.1	
	Moderate	39	23.6	
	Good	68	41.2	
	Very good	36	21.8	
Knowledge of evidence-based nursing	Very weak	0	0	0.49 ± 0.63
	Weak	17	10.3	
	Moderate	66	40	
	Good	63	38.2	
	Very good	19	11.5	
Attitudes towards evidence-based nursing	Very weak	0	0	0.87 ± 0.56
	Weak	6	3.6	
	Moderate	24	14.5	
	Good	84	50.9	
	Very good	51	30.9	
Practice in evidence-based nursing	Very weak	2	1.2	0.55 ± 0.75
	Weak	20	12.1	
	Moderate	39	23.6	
	Good	68	41.2	
	Very good	36	21.8	

SD: Standard Deviation

Table 3 Correlation between KAP clinical reasoning and Evidence-Based nursing with age of participants

	Age	
KAP component	**r***	**p-Value**
Knowledge of clinical reasoning	0.052	0.50
Attitudes to clinical reasoning	0.109	0.16
Performance to clinical reasoning	0.195	0.12
Knowledge of evidence-based nursing	0.126	0.10
Attitudes towards evidence-based nursing	0.142	0.06
Practice in evidence-based nursing	0.090	0.25

*Pearson correlation coefficient

nursing. It is particularly noteworthy that doctoral students consistently achieved superior mean scores across all components compared to their master's-level counterparts, thus indicating more advanced knowledge, attitudes, and performance in both clinical reasoning and evidence-based nursing among doctoral-level participants (Table 4). Moreover, the analysis of interrelationships between the knowledge, attitude, and performance components of clinical reasoning and their evidence-based nursing counterparts yielded uniformly positive and statistically significant correlations (Table 5). The results of multiple linear regression models showed a direct and statistically significant relationship among evidence-based nursing practice (EBN-P), with Evidence-Based Nursing Attitude (EBN-A), β = 0.462, $p < 0.001$) and Evidence-Based Nursing knowledge (EBN-K), β = 0.018, $p < 0.001$) and Educational level (β = 0.204, $p < 0.05$) (Table 6). The results of multiple linear regression models showed a direct and statistically significant relationship between clinical reasoning practice (CR-P) with clinical reasoning knowledge(CR-K), β = 0.164, $p < 0.05$) and clinical reasoning attitude (CR-A), β = 0.118 $p < 0.001$) and Educational level (β = 0.354, $p < 0.001$) (Table 7).

Table 6 Multiple linear regression analysis to investigate the relationship among evidence-based nursing practice (EBN-P) with EBN-A, EBN-K, and demographic characteristics

Independent variables	**B**	**SE**	**β**	**t**	***p*-value**
Evidence-Based Nursing Attitude (EBN-A)	0.546	0.091	0.462	5.978	$p < 0.001$
Evidence-Based Nursing knowledge (EBN-K)	0.23	0.091	0.018	0.250	$p < 0.001$
Age	0.007	0.012	0.036	0.563	0.484
Educational level	0.510	0.181	0.204	2.816	0.005

Dependent Variable: evidence-based nursing practice (EBN-P), B: Regression coefficient

SE: Standard error. β: Standardized beta coefficient

Discussion

This investigation was undertaken to evaluate the Knowledge, Attitude, and Practice (KAP) status regarding clinical reasoning and Evidence-Based Nursing (EBN) among postgraduate students at Fasa and Shiraz Universities

Table 4 Correlation between KAP clinical reasoning and Evidence-Based nursing with demographic characteristics

Variable	**CR-K**	**CR-A**	**CR-*P***	**EBN-K**	**EBN-A**	**EBN-*P***
Gender						
Female	0.74 ± 0.57	0.90 ± 0.51	0.51 ± 0.77	0.48 ± 0.65	0.89 ± 0.58	0.49 ± 0.86
Male	0.76 ± 0.56	0.85 ± 0.52	0.62 ± 0.61	0.49 ± 0.60	0.83 ± 0.53	0.61 ± 0.58
P-Value*	**0.81**	**0.58**	**0.32**	**0.96**	**0.44**	0.30
Educational level						
Ph.D.	1.19 ± 0.42	1.28 ± 0.30	1.29 ± 0.43	1.14 ± 0.28	1.30 ± 0.35	1.26 ± 0.46
MSc	0.65 ± 0.55	0.79 ± 0.51	0.39 ± 0.65	0.33 ± 0.59	0.76 ± 0.55	0.39 ± 0.73
P-Value*	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	<0.001

*Chi-square tests

Table 5 Correlation between the knowledge, attitude, and performance components of clinical reasoning and evidence-based nursing among postgraduate nursing students

KAP component	**CR-K**	**CR-A**	**CR-*P***	**EBN-K**	**EBN-A**	**EBN-*P***
CR-K	1					
CR-A	$r = 0.44$* p <0.001	1				
CR-P	$r = 0.42$ p <0.001	$r = 0.39$ p <0.001	1			
EBN-K	$r = 0.48$ p <0.001	$r = 0.43$ p <0.001	$r = 0.64$ p <0.001	1		
EBN-A	$r = 0.46$ p <0.001	$r = 0.67$ p <0.001	$r = 0.42$ p <0.001	$r = 0.43$ p <0.001	1	
EBN-P	$r = 0.35$ p <0.001	$r = 0.32$ p <0.001	$r = 63$ p <0.001	$r = 0.62$ p <0.001	$r = 0.28$ p <0.001	1

* Pearson correlation coefcient

Table 7 Multiple linear regression analysis to investigate the relationship between clinical reasoning practice (CR-P) with CR-K, CR-A and demographic characteristics

Independent variables	B	SE	β	t	*p*-value
Clinical reasoning knowledge (CR-K)	0.196	0.88	0.164	2.223	0.028
Clinical reasoning attitude (CR-A)	0.169	0.104	0.118	1.625	$p<0.001$
Age	0.290	0.013	0.155	2.273	0.27
Educational level	0.888	0.184	0.354	4.838	$p<0.001$

Dependent variable: clinical reasoning practice (CR-P), B: Regression coefficient. SE: Standard error β: Standardized beta coefficient

of Medical Sciences, while simultaneously examining associated factors. The postgraduate participants demonstrated commendable mean scores across all three components of evidence-based nursing. Multiple factors may have contributed to these elevated performance metrics, including comprehensive training in database search methodologies, sustained participation in academic seminars and journal clubs, engagement in specialized research skills workshops for thesis preparation, and extensive experience in developing evidence-based clinical guidelines derived from current, methodologically robust research evidence.

Given the demonstrated superiority of postgraduate students in implementing evidence-based nursing practices, coupled with the notable deficiencies among nursing professionals stemming from insufficient undergraduate preparation in evidence-based practice competencies, researchers have proposed multiple evidence-driven interventional strategies. These comprehensive approaches include: equipping nurses with advanced database search methodologies; facilitating specialized seminars and workshops to strengthen information retrieval competencies [22]; developing research-informed clinical guidelines for nursing implementation [23]; integrating structured evidence-based practice programs within undergraduate nursing curricula [24]; establishing mentorship initiatives to support evidence-based practice implementation (25–26); and cultivating robust organizational and managerial frameworks that simultaneously support both the practical application and educational advancement of evidence-based practice.

Valizadeh et al. (2020) identified several critical barriers impeding evidence-based practice implementation among undergraduate nurses in clinical settings: insufficient proficiency in computer and database navigation, limited English language competency, inadequate capability to assess article quality, challenges in evaluating research validity, difficulties in translating research recommendations into practice, and the notable absence of EBN-related coursework in undergraduate curricula [27]. In a separate investigation, Mangolian et al. (2016) demonstrated that final-year undergraduate nursing students exhibited moderate attitudes toward evidence-based practice, with their most favorable disposition directed toward incorporating evidence-based practice into the undergraduate nursing curriculum [28]. These findings stand in contrast to the current study, which reveals significantly more positive attitudes toward evidence-based practice among its participants. This disparity may be attributed to the current study's focus on graduate nursing students rather than undergraduates, suggesting that advanced education positively influences attitudes toward evidence-based practice [29].

Research conducted by Jarding, et al. (2021) revealed that although nurses generally maintained positive attitudes toward evidence-based nursing, their demonstrated knowledge and practice levels remained moderate to poor [30]. The markedly higher mean scores in knowledge, attitude, and practice observed among postgraduate students in the present study can be attributed to their advanced research literacy and heightened proficiency in scientific database navigation. Indeed, these superior competency levels demonstrated by postgraduate students not only reflect their enhanced research capabilities but also distinctly differentiate them from their undergraduate counterparts, thereby underscoring the pivotal role of advanced education in developing evidence-based nursing competencies.

The present investigation further revealed that postgraduate students achieved commendable mean scores across all three dimensions of clinical reasoning: knowledge, attitude, and practice. These findings stand in stark contrast to previous research conducted by Akhoondzadeh, which documented notably low levels of critical thinking skills and clinical reasoning among nursing students [31], and Sharifi, et al. study, which reported clinical reasoning skills below the 50th percentile [32]. It is particularly noteworthy that these earlier investigations focused exclusively on undergraduate students, whereas the current research examined postgraduate students at both master's and doctoral levels. The synthesis of current findings with existing literature reveals that despite the robust emphasis on clinical reasoning at the postgraduate level, the foundational framework established during undergraduate education remains insufficient and warrants substantial revision. This marked disparity necessitates the implementation of comprehensive strategies for cultivating these essential skills during the early stages of nursing education. Lending further support to this conclusion, Alyari et al.'s research demonstrated that clinical reasoning-based instruction yielded significant enhancements in participants' critical thinking skills compared to pre-intervention levels, thus empirically validating the fundamental role of clinical reasoning in nursing education [33].

Analysis revealed direct and statistically significant correlations among all components of clinical reasoning (awareness, attitude, and performance) and their corresponding elements in evidence-based nursing. These robust correlations demonstrate that nurses who have pursued or completed graduate and doctoral studies have acquired the sophisticated competencies necessary for accessing credible evidence and synthesizing pertinent knowledge. Such advanced degree holders have developed the capacity to translate evidence-based knowledge into clinical practice while optimizing decision-making processes. Moreover, the concurrent clinical employment of most postgraduate students has afforded them valuable opportunities to implement evidence-based nursing principles within their professional practice settings.

Given that bachelor's degree holders constitute the majority of hospital-employed nurses, the implementation of comparable educational programs at the undergraduate level could potentially enable these practitioners to achieve proficiency levels similar to their postgraduate counterparts in executing evidence-based practices and delivering contemporary, high-quality patient care. In this context, Soltani et al.'s investigation into barriers affecting evidence-based nursing care implementation revealed critical obstacles across multiple domains that impact clinical decision-making. Within the educational sphere, they identified a notable absence of nursing professionals adequately trained to incorporate research findings into clinical decision-making and patient care. The managerial domain revealed insufficient awareness among nursing administrators regarding the fundamental importance of evidence-based nursing practice, while the individual domain highlighted deficiencies in both skills and awareness among nursing professionals concerning evidence-based care delivery [34].

Consequently, advancing the nursing profession and transforming current students into competent practitioners capable of executing critical, contemporary nursing activities—while making optimal, evidence-informed decisions across diverse clinical scenarios—necessitates the development of sophisticated educational programs and methodologies. These initiatives must be carefully calibrated to align with existing institutional resources and conditions, while thoughtfully addressing both strengths and weaknesses across various nursing education domains, ultimately fostering enhanced evidence-based clinical reasoning capabilities.

Limitations

Although this investigation provided valuable insights into postgraduate students' knowledge, attitudes, and practices regarding clinical reasoning and evidence-based nursing, certain limitations warrant consideration. The study's exclusive focus on postgraduate students suggests a critical need for future research that encompasses undergraduate nursing students, which would yield a more comprehensive understanding of these competencies across the educational spectrum. A particularly significant limitation lies in the study's restricted sampling methodology, which substantially constrains its generalizability to broader nursing populations. Future investigations would benefit considerably from implementing more comprehensive sampling approaches and larger sample sizes at the national level. Such methodological enhancements would not only strengthen the generalizability of findings but also facilitate more informed decision-making regarding potential modifications to nursing education curricula.

Applications in nursing education

The findings from this investigation offer valuable implications for nursing education administrators in their ongoing efforts to enhance educational outcomes. These results provide a robust framework through which administrators can systematically evaluate nursing students' knowledge, attitudes, and performance in both clinical reasoning and evidence-based nursing practice. Where assessment reveals areas of deficiency, educational leaders can implement strategically targeted interventions and develop comprehensive plans to strengthen and institutionalize both critical thinking competencies and evidence-based nursing practices within the educational curriculum. The implementation of such carefully crafted improvements would ultimately contribute to a meaningful elevation in nursing service quality throughout the healthcare system, thereby enhancing patient care outcomes.

Future research endeavors should systematically examine the impact of targeted educational interventions on nurses' Knowledge, Attitude, and Practice (KAP), while simultaneously investigating the efficacy of nursing faculty and postgraduate students in facilitating evidence-based practice implementation among clinical nurses. These investigations should particularly emphasize the role of facilitative leadership and management strategies at both organizational and operational levels.

To enhance clinical reasoning and evidence-based nursing care, several sophisticated and empirically supported strategies warrant careful consideration. Systematic continuous education, comprising structured training sessions and hands-on workshops, enables nursing professionals to maintain and advance their clinical expertise. The cultivation of critical thinking skills proves essential, as healthcare practitioners must employ sophisticated analytical and problem-solving approaches within complex clinical environments. Moreover, the methodical analysis of authentic clinical cases provides invaluable learning opportunities and strengthens practitioners'

clinical reasoning capabilities. Healthcare institutions should strategically leverage contemporary technologies, including specialized software platforms and digital resources, to ensure nursing professionals have seamless access to current scientific literature and evidence-based protocols. Furthermore, the implementation of a comprehensive feedback and evaluation framework facilitates the systematic assessment of nurses' clinical performance, enabling the precise identification of both strengths and areas requiring enhancement. These interconnected, evidence-based strategies, when implemented systematically within a supportive organizational framework, can substantially enhance clinical reasoning among nursing professionals and ultimately elevate the quality of healthcare service delivery.

Conclusion

The findings of this empirical investigation revealed that postgraduate students across both master's and doctoral programs demonstrated exceptionally favorable mean scores in all three components of clinical reasoning and evidence-based nursing: knowledge, attitude, and practice. Of particular significance was the observation that doctoral students consistently achieved substantially higher mean scores across these components compared to their counterparts in master's programs. Moreover, comprehensive statistical analysis revealed robust and significant direct correlations between all clinical reasoning components (knowledge, attitude, and practice) and their corresponding evidence-based nursing components. These substantive findings not only validate the efficacy of postgraduate education in evidence-based nursing and its clinical applications for optimal decision-making but also emphatically underscore the paramount importance of incorporating such educational elements into undergraduate nursing curricula. It is through this systematic integration that future nursing professionals can develop the sophisticated competencies demanded by contemporary healthcare environments. To facilitate transformative and sustainable improvements in students' educational progression—particularly in the crucial domains of critical thinking, clinical decision-making, reasoning, and evidence-based care—it is imperative to systematically integrate specialized training methodologies into the nursing education curriculum. Such integration should emphasize three fundamental areas: the cultivation of advanced critical thinking capabilities, the enhancement of sophisticated metacognitive abilities, and the comprehensive mastery of evidence-based nursing practices. This methodically structured approach to educational advancement would optimally prepare nursing professionals across all academic levels to address the multifaceted challenges inherent in modern healthcare delivery systems.

Abbreviations

CR-A	Clinical Reasoning Attitude
CR-K	Clinical Reasoning Knowledge
CR-P	Clinical Reasoning Practice
EBN-A	Evidence-Based Nursing Attitude
EBN-K	Evidence-Based Nursing Knowledge
EBN-P	Evidence-Based Nursing Practice

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Author contributions

MB, ZM and AD have participated in the conception and design of the study. AT, SJ and ZM contributed the data collection and pre-pared the first draft of the manuscript. MB, and ZM, critically revised and checked closely the proposal, the analysis and interpretation of the data and design the article. All authors read and approved the final manuscript.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

All the participants gave written informed consent to participate in the study. This study was conducted based on the principles of the revised Declaration of Helsinki, which is a statement of ethical principles used to guide medical researchers who investigate human subjects. The subjects were assured of their anonymity and confidentiality of their information. Furthermore, this study was approved by the Institutional Research Ethics Committee of Fasa University of Medical Sciences, Fasa, Iran (ethical code: IR.FUMS.REC.1403.030).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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