Original Article

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The Cognitive Error Styles of Midwifery Students in Clinical Decision-Making: A Directed Qualitative Content Analysis Study

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Introduction: Cognitive error styles refer to faulty patterns of thinking that can negatively influence individuals' decision-making and behavior. Among midwifery students, identifying and understanding these errors is particularly important, as their decisions directly impact maternal and neonatal outcomes. Thus, the present study aimed to explain the cognitive error styles of midwifery students in clinical decision-making.

Methods: This qualitative study was carried out using a directed qualitative content analysis approach. Initially, empirical literature and studies from databases such as ERIC, PubMed, Web of Science, ScienceDirect, and Scopus were reviewed to identify relevant components of cognitive error styles among midwifery students. Next, unstructured and semi-structured interviews were conducted with 12 midwifery students (bachelor's and master's levels) enrolled at Shahrekord University of Medical Sciences, Iran, from August 2023 to May 2024.

Results: Among 32 main categories extracted from the literature review, 11 functional components of cognitive error styles were confirmed by the midwifery students, including emotional reasoning, procrastination, lack of confidence, anchoring , recency bias, catastrophizing, stereotyping, negative filtering, labeling, fortune telling, and all-or-nothing thinking.

Conclusions: Given the significant impact of cognitive error styles on clinical decision-making by midwives and midwifery students, it is essential to identify the causes of medical errors associated with these cognitive biases to minimize mistakes and their related financial consequences. A deeper understanding of these errors can ameliorate the education and clinical performance of midwifery students, ultimately enhancing healthcare delivery.

Keywords: Midwifery; Students; Cognition; Diagnostic errors; Qualitative research

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Introduction

Medical errors are now recognized as the third leading cause of death, surpassed only by cardiovascular disease and cancer (1). These errors, given their highly complex nature (2), remain a critical unresolved challenge in healthcare, imposing profound clinical and financial costs (3). In addition to system-related and reporting errors, some arise from cognitive errors—incorrect thinking patterns and mental deviations in information processing—which alter clinical reasoning and decision-making. All these potentially lead to misdiagnosis, mismanagement, or inappropriate treatment, especially in emergency or uncertain situations (1, 4, 5).

Cognitive errors can occur in any member of the medical staff, but they are more significant when they occur in the staff who make decisions independently, such as midwives. Moreover, they deal with pregnant women, and the errors they make can endanger both the pregnant woman and her fetus (6, 7). Thus, identifying the factors associated with midwifery errors and providing appropriate solutions to reduce their occurrence and the resulting complications are significant for delivering suitable midwifery services (8). A study reported that nurses and midwives play an important role in preventing medical errors as they are in contact with women for a longer period (9). It has been found that newly recruited midwives are reluctant to accept responsibility and make decisions alone. This may emanate from inadequate training of students in the necessary skills and knowledge of critical decision-making (10, 11). Thus, in addition to theoretical and practical learning experiences, midwifery students should be trained in appropriate decision-making in critical situations to encourage further professional development (12), leading to improved professional performance and reduced professional errors (13, 14). Accordingly, examining the cognitive error styles of midwifery students is not only scientifically important but also can help design effective educational programs as well as boost the cognitive skills of these students. The present study, therefore, aimed to explain the cognitive error styles of midwifery students in clinical decision-making to provide better care in healthcare environments.

Methods

Literature Search

A broad search strategy was applied using the following English keywords: cognitive bias, diagnostic error, diagnostic bias, medical errors, cognitive diagnostic errors, cognitive error, clinical decision-making, and midwifery students. The search was done across databases such as ERIC, PubMed, Web of Science, ScienceDirect, and Scopus (Table 1). The main inclusion criteria were articles published in English between 2000 and July 2023 exploring cognitive error styles in midwifery students. The exclusion criteria were conference papers, letters to the editor, inability to access full-text articles, and studies irrelevant to the research topic. In the initial search, 125 articles were identified. After removing duplicates and irrelevant studies, 65 articles were screened. Subsequently, abstracts were reviewed against the inclusion and exclusion criteria, and 18 articles were finally examined in full text. At this stage, functional components (cognitive error styles of midwifery students) were extracted.

Data Collection

Data were collected through initial semi-structured interviews, guided by an interview protocol which included one or two open-ended questions designed to encourage participants to share their experiences in clinical decision-making freely. This initial phase was intended to promote a deeper understanding of the subject matter as well as to identify preliminary concepts that could inform subsequent interviews.

"Could you describe an experience you've had with clinical decision-making during your internship or training?", "Can you recall a situation where a clinical decision you made did not bring about the desired outcome, or one that you later realized was incorrect? If so, please elaborate." Subsequently, the questions were refined, and the interviews proceeded in a semi-structured format. This phase involved targeted questions that aimed

Table 1: Boolean Search Strategy Table

Category	Keywords/Search	Terms Boolean Operators	Databases Searched
Cognitive Error	"Cognitive bias" OR "diagnostic error" OR "diagnostic bias" OR "cognitive diagnostic errors" OR "cognitive error"	OR	ERIC, PUBMED, Web of Science, SCIENCE DIRECT, SCOPUS
Medical Errors	"Medical errors"	OR	
Clinical Reasoning	"Clinical decision making"	OR	
Target Population	"Midwifery students"	OR	
Overall Search	Overall Search (Category 1) AND (Category 2) AND (Category 3) AND (Category 4)	AND	

at identifying common cognitive errors in clinical decision-making. For instance:
• What factors typically influence your clinical decision-making process?
• Does your decision-making approach change when you are under pressure or feeling stressed? If so, how?
• Have you ever made errors because of overconfidence in your own initial impressions or in the opinions of others?
• What strategies do you employ to minimize cognitive errors in your decision-making?

Setting and Participants

A total of 14 interviews were conducted with 12 midwifery students (participants 4 and 7 were interviewed twice to allow for follow-up). The participants consisted of undergraduate and graduate students of midwifery at Shahrekord University of Medical Sciences, Iran, with the interviews conducted between August 2023 and May 2024.

The inclusion criteria were being an undergraduate or graduate midwifery student at Shahrekord University of Medical Sciences, being willing to participate in the study, and having clinical experience (at least one year of clinical experience in medical or midwifery centers in the field of direct patient care). On the other hand, students who were not active in a clinical setting at the time of the study were excluded from the study. The participants were selected using purposive sampling to ensure maximum diversity in terms of age, academic semester, and educational level. Data collection continued until data saturation was achieved.

Ethical Considerations

To comply with ethical principles in research, the researcher obtained approval from the Ethics Committee of Shahrekord University of Medical Sciences (IR.SKUMS.REC.1401.003) to conduct sampling and interviews. All interviews were done after providing a full explanation of the study and assuring the participants of the confidentiality of their information, while respecting their privacy as well as obtaining both oral and written informed consent. Each participant was assigned a specific code to maintain confidentiality. With permission, interviews were audio-recorded and transcribed on the same day or, at the latest, the following day. In cases where participants asked the researcher not to record certain parts of their interview, the recording was paused, and those segments were documented in writing. Each interview lasted from 45 to 60 minutes. Data collection was carried out over a period of nine months.

Data Analysis

Cognitive error styles were extracted from the participants' responses in the form of categories and subcategories. This process was performed manually in several stages, involving extensive rereading by the authors. To ensure accuracy, the extracted components and categories were reviewed and approved by two other researchers experienced in the field. Following their approval, the division of components and subcomponents was finalized.

Concurrent with conducting new interviews and analyzing previous ones, the classification process started. The unit of analysis was defined as themes, which could be derived from a sentence, a paragraph, or an entire interview. A systematic, step-by-step coding method was employed to ensure credibility (15).

All interviews were reviewed concerning the main components of cognitive error styles to determine the applicability of categories to individuals. Meanwhile, the researchers aimed not only to confirm existing categories but also to identify important and, in some cases, ambiguous points during subsequent readings. The goal was to immerse in the data to extract the main categories and subcategories. Ultimately, the extracted points and themes were categorized and compared with predefined categories, whereby no new categories were added, and some initial ones were removed.

To ensure coding consistency, all interviews were re-coded and reviewed by the researchers. Comparison of the two coding rounds confirmed the coding stability. Note that rereading and recoding improved the completeness and appropriateness of the categorization. Finally, 11 categories were identified as functional components.

To enhance the validity, several triangulation strategies were utilized. Data source triangulation was achieved by including participants with diverse professional experiences, perspectives, academic levels, and semesters. Methodological triangulation involved concurrent data collection and analysis, using themes emerging from initial interviews to inform subsequent ones. Further, two researchers independently reviewed the extracted components, categories, and subcategories to improve rigor. Finally, member checking was performed with three participants to verify the accuracy of the findings.

Rigor

To ensure the accuracy and reliability of the data, four criteria—acceptability, reliability, verifiability, and transferability—were

applied (16). To enhance credibility, prolonged engagement was maintained with a diverse range of participants varying in age, marital status, and education level. This was complemented by multi-session data collection, in-depth interviews, and member checking, where three participants reviewed and confirmed the accuracy of their data. To ensure dependability, all stages of the research—including participant recruitment, data collection, and analysis—were documented in detail to maintain an audit trail. To strengthen transferability, rich contextual descriptions of the research setting and detailed transcripts of participant responses were recorded. Furthermore, an external audit was conducted by two qualified students independent of the study, further reinforcing the applicability of the findings. Finally, to establish confirmability, the entire data analysis process—from initial coding and code categorization to theme development—was comprehensively documented, allowing for independent verification by other researchers.

Results

As reported in Table 2, eight participants were bachelor's students in midwifery (enrolled in semesters 6 or 8), while the remaining were master's students (enrolled in semesters 2 or 4). The youngest participant was 21 years old, while the oldest was 30. Among the 32 main categories extracted from the literature and previous studies, only 11 categories/components were confirmed by the majority of midwifery students. The 11 cognitive errors were selected based on their high frequency, direct relevance to clinical decision-making, and frequent mention in interviews. Other categories were excluded because of the low frequency or irrelevance to the concept of cognitive bias.

The following section provides explanations and examples of the functional components of cognitive error styles identified in midwifery students, along with their sources from the interviews.

1) The influence of emotions (emotional reasoning), Interviews 1, 2, 4, 8, 9, 10, and 12

Emotional reasoning can obscure an individual's objective perception of events across all aspects of life. This is particularly evident in the midwifery profession, where midwives and midwifery students frequently encounter intense emotions during care provision. According to participants' statements in this study, emotional reasoning and dealing with such emotions can distance them from reality and adversely affect the quality of service delivery.

Participant 9 described the impact of errors on the provision of care as follows: "Our field is sensitive and full of emotions, especially in the delivery unit. I myself cry and get upset when a pregnant woman goes through labor pains, or when a miscarriage or stillbirth happens, and I cannot do what is necessary for the pregnant woman. The same takes place in the neonatal intensive care unit; when I see a child with cerebral palsy, which happened because of an error, I feel extremely guilty and upset for several days. I would not want to go to that unit again".

On the other hand, in this type of error, individuals may mistake their feelings for reality. Participant number 2 stated in this regard: "I recall in the early days, my instructor told me to care for the newborn after delivery. Once, over the baby, I became very worried and anxious, I was heartbroken! I thought to myself, 'Something terrible must have happened to this baby, simply because I'm feeling this way! While everything was normal."

2) Procrastination (Neglect), Interviews 1, 4, 5, 8, 10, and 12

Some midwifery students do not complete the tasks assigned to them by a certain deadline and postpone their decision-making, with the knowledge of the negative consequences. Moreover, their procrastination is often accompanied by anxiety and worry.

Table 2: Demographic characteristics of the study participants

	Educational level	Semester	Age	Marital status
1	Bachelor	6	22	Single
2	Bachelor	6	21	Single
3	Bachelor	6	22	Married
4	Bachelor	6	21	Single
5	Bachelor	8	22	Single
6	Bachelor	8	25	Single
7	Bachelor	8	23	Single
8	Bachelor	8	21	Married
9	Master	2	26	Single
10	Master	2	30	Married
11	Master	4	28	Married
12	Master	4	24	Single

Participant number one described her experience with procrastination as follows: "We are not where we need to be; as our teacher says, sometimes we don't even realize that this is an emergency. For example, when the fetal heart rate is dropping, our instructor tells us to bring an oxygen mask for the pregnant woman or to put her in her left lateral position. However, we all look at each other, or one of us goes to fetch a mask but doesn't come back; that's why our teacher says that we don't take anything seriously!"

3) Lack of confidence, Interviews 2, 3, 5, 7, 11, and 12

Research participants noted the important role of having sufficient self-confidence in preventing cognitive bias. On the other hand, lack of self-confidence may cause students to hesitate in clinical decision-making or avoid important responsibilities. Most participants mentioned their clinical instructors as a source and role model for gaining self-confidence. They also emphasized the direct relationship between the clinical instructor's self-confidence and the midwifery students' self-confidence.

Participant number 11 stated in this regard: "Most instructors, especially in the delivery block, lack self-confidence. Thus, the student does not gain self-confidence and grows weak. If the instructor has high self-confidence, he would be a very good role model for the student and the student's practical knowledge will grow."

4) Anchoring Bias, Interviews 2, 3, 6, 7, 10, and 12

One of the cognitive errors, emphasized by midwifery students, was anchoring. The participants in the study often relied on the first information they had obtained in the field of clinical issues. Meanwhile, their minds were stuck on the theoretical information they had learned in theoretical courses which did not allow them to search further. In other words, this type of cognitive error takes place when a person becomes too dependent on the first information and makes decisions based on it solely. Participant number 3 attributed the reason for this to the performance of his clinical instructors and stated in this regard: "In our training courses, instead of emphasizing and performing procedures, we still work on theoretical lessons and we only take books to the ward and work with the books. When we ask the professor why the routine is different from the book? Or why do the residents and midwives in the ward manage differently? He says: I don't care about them and their references. My references are just those books and whatever I say is correct. I have nothing to do with other professors. However, I think, if we can work with national guidelines or any other reference alongside the book, we will definitely be able to work better in the clinic."

Participant number 6 also expressed his experience of focusing too much on the first clinical signs that led to misdiagnosis: "...We always think that a pregnant woman who comes to us with high blood pressure has preeclampsia (pregnancy toxemia); we don't pay attention to any other symptoms; our thoughts quickly shift to preeclampsia".

5) Recency Bias, Interviews 1, 3, 4, 6, 8, and 12

One of the causes that leads to bias and cognitive error among midwifery students was the recency bias. In this type of cognitive error, the student assigns too much importance to the latest information or recent experiences and considers them more important than previous or general information. Based on the participants' statements, especially when dealing with rare clinical cases, their clinical decisions are influenced by the latest and most recent information they receive. In other words, the students' decisions were overshadowed at the last moment.

Participant 6, a bachelor's degree student in midwifery, about her experience of working in a gynecologic clinic stated: "We don't see many cases in the clinic and we may not see any cases of gynecologic diseases at all, or we may only see one during the entire course of study; thus, we recommend the necessary measures and treatment based on the opinion of the gynecologist or the last and only case we saw."

6) Catastrophizing, Interviews 1-4,6-9, and 12

In this type of error, the student exaggeratedly predicts a very negative and unrealistic outcome for a simple event. Some participants stated that when dealing with emergency situations, they often consider what has happened to be unbearable and even terrible, resulting in hasty conclusions regarding the provision of services and clinical decision-making, which may not be the right decision. Indeed, in this case, people think about the worst possible outcome of the situation and may fail to reason logically.

Participant number 9, a second-semester student in the Master of Midwifery, stated in this regard: "Many times in my maternity internship, I can't do anything or I do the wrong thing, especially when in emergencies, I feel like the world is ending! For example, when I went to see a pregnant woman, who was bleeding after giving birth, our teacher told me to take another vein from her, quickly. I was shocked to see her bleeding like that and thought to myself, what if she dies? How will this bleeding stop? Whatever

our teacher said, "Where are you?" "Take another vein," I just watched."

7) Stereotyping, Interviews 1, 2, 4, 5, 7, 8, and 11

Stereotyping is a cognitive error, in which midwifery students judge people based on their general perceptions or beliefs about them. This type of thinking can have negative effects on decision-making and clinical interactions in the medical profession, particularly among midwifery students. Participant number 7, who was an 8th semester midwifery student, stated in this regard: "Sometimes when we are providing postpartum education, if we see that the patient has low education or is not in a good financial condition, we do not tell him many important things like how to care for an episiotomy or about proper nutrition because we think if he does not comply anyway, why bother ourselves!"

8) Negative filtering, Interviews 3, 7, 10-12

Some participants shared experiences in paying attention to the negative aspects of acquiring skills and working in the clinic while ignoring its positive aspects. Indeed, in this group of participants, one negative point in a set makes the whole set appear negative to the individual. Typically, this group of midwifery students hardly enjoy their internship and have low motivation to acquire knowledge and skills.

Participant number 7 stated the following points about her diminished motivation in internships owing to the interactions of the treatment team: "I have no motivation at all to work as an intern in the clinic, learn the diagnosis and procedures. When my mentor brings up a case, I either remain silent or blurt something out without thinking, and all this is because everyone looks down on us. When a first-year resident who has just come in and knows nothing insults my mentor with 20 years of experience and does not accept his work, we no longer have any motivation to work in the clinic."

9) Labeling, Interviews 2-5, and 12

The participants in the study pointed to a type of cognitive bias which is the result of labeling the midwifery profession. According to the participants, they were often unable to make the right decision in different situations because of the background that the midwifery profession is very difficult and stressful, and the rate of clinical errors in them increased.

Participant number 12, who was a master student in midwifery, stated: "We were always told to be careful that midwifery is a challenging and responsible field, and most importantly, a field full of errors; saying all these negative sentences made me not make the right decision when I wanted to do something for the patient because I thought I would end up making a mistake."

10) Fortune telling, Interviews 4, 6, 8, 9, and 11

According to the results, some midwifery students start to predict clinical outcomes based on insufficient or no evidence, thinking that unfavorable things will happen. This takes away the courage to acquire new skills and manage new clinical cases. This type of thinking can have negative impacts on midwifery students, especially in situations where quick and accurate decision-making is required.

As to predicting adverse clinical events, participant number 9 stated: "When an emergency case comes to the delivery block and our professor asks for quick help, I feel afraid to go; I'm scared of the fact that the pregnant woman may die or the fetus may be lost! I once gave the wrong antibiotic injection to the patient. Our professor found out about it and scared me a lot about the patient's health. I'm always with another student in the clinic because I'm afraid that something bad will happen and I'll be blamed. And on days when our professor is not there, I don't visit the patient because I think something bad is going to happen to the patient."

11) All-or-Nothing thinking, Interviews 2, 3, and 5

The participants in the study noted that in some cases or events around them, they get involved in all-or-nothing thinking. In these cases, the participants get involved in black-or-white thinking, whereby all-or-nothing thinking guides their thoughts. In other words, in this type of error, the person views the issues as completely positive or completely negative and does not accept any intermediate state; they consider themselves either highly skillful or not at all.

Participant number 2 stated in this regard: "I was the top student until the 4th semester. Now that I am in the 6th semester, I have the best grades in theory courses, but I feel weak in clinical practice. Our professor also says: "What kind of top student are you that you are so weak in clinical practice?" And when I give a wrong diagnosis to a patient, I blame myself for not knowing and I think that I should know everything; I feel that I am not useful for this field at all."

Discussion

The present study aimed to identify the cognitive error styles of midwifery students in clinical decision-making using qualitative content analysis. Out of 32 main categories extracted from studies and literature reviews, only 11 functional components of cognitive error styles were endorsed by most midwifery students

(including emotional reasoning, procrastination, lack of confidence, anchoring, recency bias, catastrophizing, stereotyping, negative filtering, labeling, fortune telling, and all-or-nothing thinking). The results revealed that the cognitive error styles identified in this study would significantly affect the knowledge and skills of midwifery students and can negatively impact their decision-making, clinical performance, and self-confidence. Undoubtedly, cognitive biases are among the most important factors contributing to medical errors, yet they have been largely overlooked in education and clinical practice. The participants in our study were students still undergoing training. The various challenges they reported regarding critical biases highlight the necessity of designing additional medical education and training programs with a focus on the continuous enhancement of critical thinking skills, cognitive-emotional biases, and their effects on decision-making processes. To devise effective strategies, it is essential to understand the diverse aspects of cognitive errors to ameliorate decision-making, thereby reducing medical errors and the resulting significant human as well as financial losses (17).

According to the literature, cognitive errors are present in clinical practice, and enhancing our knowledge as well as awareness of their causes can lower the incidence of medical errors (18). A review of 20 studies involving 6,810 physicians indicated a positive association between cognitive biases and therapeutic or management errors in 71% of cases; contributing factors included overconfidence, low risk tolerance, the anchoring effect, along with information and availability biases (19). In addition to physicians, midwives maintain personal contact with patients (women) and make clinical decisions independently. Decision-making in midwifery requires interpersonal negotiation, sensitivity, awareness, and consideration for the environment as well as individuals; thus, partnership with women is essential alongside primary healthcare strategies (20). Based on students' perspectives, we identified 11 significant causes of cognitive error. Notably, the results indicated that, in addition to anchoring and recency bias—both related to theoretical knowledge—most other aspects were linked to emotions, resulting in lack of confidence, emotional reasoning, catastrophizing, and all-or-nothing thinking. The interaction style of midwives differs from that of physicians, in whom overconfidence often results in cognitive errors, though the anchoring effect was similar in both groups, consistent with findings from related studies on physicians (19, 21, 22). The findings of the present study are in accordance with similar research conducted in related healthcare fields, such as the study by Deveau and Redmond (2021), which explored cognitive biases in nursing students through simulation-based learning (23). Their study identified anchoring bias as the most prevalent cognitive error (63%), followed by confirmation bias (47%). These findings are in line with our results, where anchoring and recency biases were among the most common cognitive errors observed in midwifery students. Nevertheless, a notable distinction in our study is the prominent role of emotional cognitive errors, including lack of confidence, emotional reasoning, and catastrophizing, which may be attributed to the unique professional responsibilities as well as emotional demands inherent in midwifery practice.

Further support for our findings emerges from qualitative studies of midwives' decision-making abroad. For example, Daemers, et al. (2017) found that the clinical decisions of primary care midwives were shaped not only by evidence but also by personal attitudes, professional experience, and contextual pressures—factors suggestive of cognitive bias pathways (24). Similarly, Cioffi (1997) reported that midwives in simulated high-complexity cases relied heavily on heuristics such as representativeness, facilitating faster yet bias-prone decisions (25). These findings are in the same line with our identification of anchoring and emotional reasoning among midwifery students and highlight the importance of structured education addressing both heuristic reliance and emotional triggers.

Furthermore, the findings of our study are supported by research in nursing education exploring how perceptual and cognitive biases influence clinical reasoning. In a simulation-based study using eye-tracking technology, Al-Moteri, et al. (2020) found that approximately 63% of nursing participants exhibited cognitive biases which diverted their attention from key clinical cues, resulting in diagnostic inaccuracies. This finding emphasizes the role of attentional misdirection and perceptual salience in the development of cognitive errors, particularly anchoring and omission biases. It highlights the need for structured feedback and training approaches that target not only cognitive awareness but also perceptual cue recognition and processing—elements that are critical in both nursing and midwifery clinical decision-making (26).

Therefore, midwifery students appear to manifest a distinct pattern of cognitive errors. This divergence may stem from fundamental differences in their educational training, patient

interaction dynamics, and the unique professional responsibilities inherent to midwifery (27). Midwifery decision-making demands exceptional communication skills, empathy, situational awareness, and sensitivity to human factors — all of which may expose students to psychological and emotional pressures (28).

Meanwhile, midwives and instructors should support midwifery students in enhancing their capacity, confidence, and motivation to learn new skills. Active supervision by instructors during students' clinical practice, with adequate attention to the quality of care provided, is essential for lowering medical errors among midwifery students (29). Students should also be taught how to learn from their errors, rather than being blamed for them and developing a lifelong fear of making mistakes. The findings are consistent with those of Van Geene, et al. (2016), who reported that experiential learning enhanced awareness of cognitive biases in diagnostic reasoning. Their study indicated that medical students analyzing clinical scenarios with misleading information became more sensitive to subtle cues through structured debriefing. Although awareness did not completely eliminate errors, direct experience ameliorated bias recognition in future cases (30). These results highlight the significance of hands-on, reflective training to deepen cognitive insight and improve clinical decision-making, supporting our educational recommendations for midwifery students.

Apparently, a student with inadequate clinical experience is often afraid to make decisions regarding the patient's diagnosis or to prescribe appropriate treatment. The mentor should encourage students and provide them with sufficient confidence to engage in clinical settings, acquire new clinical skills, and undertake a variety of tasks to boost their self-confidence, expertise, and ability to learn from their mistakes (31, 32). Our findings demonstrate that addressing midwifery students' emotional and psychological needs is just as essential as training their cognitive skills. To effectively develop clinical competence, instructors should offer active support through constructive mentorship which fosters learning from mistakes without judgment and provides ample opportunities for practice. This comprehensive approach is critical for enhancing students' self-confidence and decision-making abilities in real-world clinical settings. This perspective is supported by the findings of Thompson, et al. (2025), who emphasized that clinical decision-making in healthcare students was not solely influenced by cognitive skills but was also shaped by emotional regulation as well as metacognitive awareness. In their mixed-methods study, students with greater emotional self-regulation and reflective practice revealed better diagnostic reasoning and were less prone to cognitive biases (33). These results reinforce the significance of integrating emotional resilience and metacognitive training into clinical education to reinforce accurate decision-making under pressure.

Note that medical errors not only harm the patient but also affect the clinician—whether physician or midwife—, causing significant embarrassment and depression. This, in turn, may negatively influence the clinician's medical decision-making, creating a vicious cycle (34). Students who are still in the process of learning should be made aware of various aspects of cognitive bias, as meticulously explained in the present study, and should be educated about different biases in clinical decision-making (35). Early detection of cognitive errors by medical professionals is essential to improve clinical judgment and avoid biases, which also requires close monitoring of educators' performance (36). Effective strategies for de-biasing in medical science are necessary to improve both patient care and clinicians' mental well-being (37), which calls for empowering education (38).

The present study has been the first in Iran to explore the pattern of cognitive errors among midwifery students. Further, given the qualitative nature of the study, valuable insights were obtained. Despite these strengths, the study had some limitations. Since the identified cognitive biases were based on a literature review and electronic database searches, it is possible that some relevant articles were not included. Also, as this was a qualitative, context-based study, the findings cannot be generalized. Another limitation was the relatively small number of midwifery students at Shahrekord University of Medical Sciences; however, efforts were made to ensure sufficient diversity among the sample. Note that some students may not have fully expressed their experiences related to cognitive error styles, and some participants may have been more influential in sharing their experiences than others.

The implications of this study are directly derived from the findings of the current research and highlight the importance of identifying and understanding cognitive error styles in the clinical decision-making of midwifery students. Based on these results, targeted education on cognitive errors—especially for midwifery students and recent graduates—can significantly improve diagnostic accuracy and lower medical errors. Practical recommendations from this study include designing structured educational

programs to enhance self-awareness and critical thinking, conducting clinical simulation workshops to strengthen decision-making skills, as well as developing evidence-based clinical guidelines aiming at preventing cognitive errors. Implementing these interventions is expected to boost the quality of midwifery care and reduce complications associated with clinical errors.

Conclusion

Given the importance of cognitive error styles and their influence on the clinical decisions as well as judgments of midwifery students and midwives, recognizing the causes of medical errors arising from these cognitive errors is critical to reduce medical errors and the resultant significant human and financial losses, as well as to avoid falling into the trap of cognitive biases. The present study identified these causes, and its findings can be utilized in future research to design educational strategies which aim at lowering cognitive errors among midwifery students, ultimately resulting in improved clinical decision-making within this group.

Authors' Contribution

H.S, E.A and SAR.RD contributed to Concept, Design, Data Collection, Analysis and Drafting. Z.RD contributed to Concept, Design, Project administration, Data Collection, Analysis and Drafting. All authors contributed to the discussion, read and approved the manuscript, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest

The authors declare no conflicts of interest.

Declaration on the use of AI

The authors of this manuscript declare that no artificial intelligence (AI) was used during the writing process.

References

1. Yazdani S, Hoseini Abardeh M. Five decades of research and theorization on clinical reasoning: a critical review. Adv Med Educ Pract. 2019;10:703-16.
2. Hayward RA. Counting deaths due to medical errors. JAMA. 2002;288(19):2404.
3. Graber ML, Wachter RM, Cassel CK. Bringing diagnosis into the quality and safety equations. JAMA. 2012;308(12):1211-2.
4. Crupi V, Elia F. Understanding and improving decisions in clinical medicine (I): reasoning, heuristics, and error. Intern Emerg Med. 2017;12(5):689-91.
5. Boyle DJ. Cognitive errors. In: Patient Safety in Surgery. Cham: Springer; 2014. pp. 19-32.
6. Koç E, Birsen A. Determination of knowledge and attitudes of midwifery and nursing intern students about medical malpractice. J Clin Nurs. 2017;26(21-22):3404-12.
7. Muoni T. Decision-making, intuition, and the midwife: understanding heuristics. Br J Midwifery. 2012;20(1):52-6.
8. Cheraghi A, Riazi H, Emamhadi M, Jambarsang S. Occupational factors related to midwifery faults from the viewpoint of midwives working in Tehran city, Iran. Iran J Forensic Med. 2020;26(2):131-7.
9. Kruk ME, Kujawski S, Mbaruku G, Ramsey K, Moyo W, Borghi J, et al. Role of nurses and midwives in improving patient safety during childbirth: evidence from obstetric trauma in OECD countries. BMC Pregnancy Childbirth. 2020;20:739.
10. Sakala BK. Factors influencing midwifery clinical decision-making. Int Ann Sci. 2019;7(1):28-32.
11. Halimi FN, Zolkefli Y. When student midwives make clinical mistakes: a qualitative study in Brunei Darussalam. Int J Care Scholars. 2024;7(1):54-63.
12. Panda S, Dash M, John J, Rath K, Debata A, Swain D, et al. Challenges faced by student nurses and midwives in clinical learning environment: a systematic review and meta-synthesis. Nurse Educ Today. 2021;101:104875.
13. Lee JJ, Clarke CL, Carson MN. Nursing students' learning dynamics and influencing factors in clinical contexts. Nurs Educ Pract. 2018;29:103-9.
14. Santos APS. Nursing students' errors in clinical learning: qualitative outcomes in mixed methods research. Rev Bras Enferm. 2019;72(1):170-6.
15. Parhoodeh F, Erfani N, Parhoodeh F. A reflection on the qualitative research approach with emphasis on validity and reliability. Pouyesh Hum Educ. 2022;8(28):19-44.
16. Kyngäs H, Mikkonen K, Kääriäinen M. The application of content analysis in nursing science research. Cham: Springer; 2019.
17. Saeedi MT, Arbabi M. The role of cognitive biases in medical errors: a review of the literature, concepts and definitions. J Clin Med. 2021;10(2):412.
18. O'Sullivan ED, Schofield S. Cognitive bias in clinical medicine. J R Coll Physicians Edinb. 2018;48(3):225-32.
19. Saposnik G, Redelmeier D, Ruff CC, Tobler PN. Cognitive biases associated with medical decisions: a systematic review. BMC Med Inform Decis Mak. 2016;16:138.
20. Jefford E, Fahy K, Sundin D. Decision-making theories and their usefulness to the midwifery profession both in terms of midwifery practice and the education of midwives. Int J Nurs Pract. 2011;17(3):246-53.
21. Stiegler MP, Tung A. Cognitive processes in anesthesiology decision making. Anesthesiology. 2014;120(1):204-17.
22. Farhadi N, Ezati M, Shojaie AA, Hatami J, Salehi K. Cognitive errors associated with medical decision-making: a systematic review. Curr Psychosom Res. 2022;1(1):28-49.
23. Deveau MZ, Redmond S. Exploring cognitive biases and clinical reasoning during simulation with BScN students. Clin Simul Nurs. 2021;61:1-5.
24. Daemers DOA, van Limbeek EBM, Wijnen HAA,

Nieuwenhuijze MJ, de Vries RG. Factors influencing the clinical decision making of midwives: a qualitative study. BMC Pregnancy Childbirth. 2017;17:345.
25. Cioffi J, Markham R. Clinical decision making by midwives: managing case complexity. J Adv Nurs. 1997;25(2):265-72.
26. Al Moteri MO, Cooper S, Symmons M, Plummer V. Nurses' cognitive and perceptual bias in the identification of clinical deterioration cues. Aust Crit Care. 2020;33(4):333-42.
27. Daemers DOA, van Limbeek EBM, Wijnen HAA, Nieuwenhuijze MJ, de Vries RG. Influencing factors in midwives' decision-making during childbirth: a qualitative study in the Netherlands. BMC Pregnancy Childbirth. 2018;18:331.
28. Hunter B, Warren L. Midwives' experiences of workplace resilience. Midwifery. 2014;30(8):926-34.
29. Asadi L, Dafei M, Mojahed S, Safinejad H. Clinical error management training for midwifery students in Shahid Sadoughi University of Medical Sciences, Yazd. J Educ Health Promot. 2021;10:33.
30. Van Geene R, van der Meer M, de Bruin ABH, van Gog T. The role of experiential learning in raising awareness of cognitive biases during diagnostic reasoning. Med Educ. 2016;50(4):417-25.
31. Lendahls L, Oscarsson MG. Midwifery students' experiences of simulation- and skills training. Nurse Educ Today. 2017;50:12-6.
32. Mbakaya BC, Kalembo FW, Zgambo M, Konyani A, Lungu F, Tveit B, et al. Nursing and midwifery students' experiences and perception of their clinical learning environment in Malawi: a mixed-method study. BMC Nurs. 2020;19:116.
33. Awanzo A, Thompson J. Cognitive biases in clinical decision-making in prehospital critical care: a scoping review. Scand J Trauma Resusc Emerg Med. 2025;33(1):101.
34. Croskerry P. From mindless to mindful practice—cognitive bias and clinical decision making. N Engl J Med. 2013;368(26):2445-8.
35. Scholes J, Endacott R, Biro M, Bulle B, Cooper S, Miles M, et al. Clinical decision-making: midwifery students' recognition of, and response to, post-partum haemorrhage in the simulation environment. BMC Pregnancy Childbirth. 2012;12:19.
36. Botma Y, Nyoni C. What went wrong? A critical reflection on educator midwives' inability to transfer education knowledge. J Nurs Educ Pract. 2015;5(6):1-8.
37. Lambe KA, O'Reilly G, Kelly BD, Curristan S. Dual-process cognitive interventions to enhance diagnostic reasoning: a systematic review. BMJ Qual Saf. 2016;25(10):808-20.
38. Arefi MF, Pajohideh Z, Pouya AB. A qualitative and quantitative assessment of the risk of human errors in midwifery tasks in child delivery ward using engineering approach (EA) and predictive human errors analysis (PHEA). Malays J Med Health Sci. 2020;16(3):60-7.