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# Clinical error management training for midwifery students in Shahid Sadoughi University of Medical Sciences, Yazd

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## Abstract:

**INTRODUCTION:** Today, the quality of health services is considered to be providing “error-free” services, at the right time, by the right person and with the least resources. In recent years, education through evidence-based care has been emphasized by health system policymakers as a way to improve care standards. Therefore, the purpose of this study is to teach clinical error management to midwifery students in Shahid Sadoughi University of Medical Sciences in Yazd.

**METHODS:** The present study was performed using consensus-based methods based on Delphi technique to identify the most common errors and the best educational solution for its management with the participation of 21 midwives by purposive sampling method in Shahid Sadoughi University of Medical Sciences in Yazd in 2018. The rate of agreement was 75% or more. Descriptive statistical methods and SPSS-18 software were used for analysis.

**RESULTS:** The most important errors mentioned were as follows: In the field of hospital care, it was the scope of care during labor and in clinical care, it was the scope of prenatal care. The most important error reduction strategies that were considered in the clinical guide in general were emphasizing the following: active supervision of instructors during the provision of students’ clinical services, paying attention to the evaluation of service provision with the least incidence of errors in end-of-course evaluation, make changes in clinical teaching methods, attention to the use of active teaching methods and the use of educational software. The cases were considered separately in each of the mentioned errors.

**DISCUSSION AND CONCLUSION:** Incidence of errors in pregnancy and childbirth as the most errors of midwifery students in the field of hospital and clinical care was agreed on. Therefore, considering this issue and the importance of preventing errors to provide quality services to mothers and infants, it seems that it is time to make changes in clinical education in this field by emphasizing the use of active educational methods.

## Keywords:

Education, error, midwifery

## Introduction

Health fields are among the most important sectors in social and economic activities of any country. Huge resources are spent every year in this sector to meet health and medical needs. The ultimate goal of each country’s health-care system is to improve the health of the people and promote fair health among

them.<sup>[1]</sup> In this system, which consists of health care workers, specialists, structures, components and multiple relationships, the issue of quality has a special place, because the serious task and mission of maintaining health and caring for the life of society is the responsibility of this sector.<sup>[2]</sup> The importance of preventing medical errors in this sector, especially now, is to the extent that today the quality of health services is considered to be “error-free” service, at

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the right time, by the right person and using the least resources.<sup>[3]</sup> However, this system has complexities because its services are patient-centered, no person or system is error-free, and no specialty has absolute immunity.<sup>[4]</sup> The unique position of a midwife is also due to her great responsibility as it covers a wide range of health services. The midwife is responsible for all her actions, although she may start care and treatment by other people in a team. This leads to teamwork with different professionals. In fact, it's the team that makes midwives dependent on other specialties, creating more job responsibilities and making midwives more risky, and in some cases leading to malpractice lawsuits. For this reason, in addition to midwives, gynecologists, or even anesthetists are involved.<sup>[1]</sup> Therefore, midwives deserve to be rewarded for doing this great responsibility properly, and vice versa, if the patient's rights are not observed or the activity is performed illegally, they will cause treatment violations. This violation in most cases leads to complaints from the patient.<sup>[5]</sup> In recent years, we have witnessed a high rate of complaints from patients, which has led to a kind of medical crisis. The occurrence of medical violations, followed by complaints and lawsuits of patients and finally their request for compensation, has caused the medical community and medical staff to face an increasing crisis. All of this has led to increased costs of compensation and medical liability insurance among gynecologists and obstetricians.<sup>[4]</sup> International reports on the frequency of complaints from physicians in different countries indicate that, unfortunately, despite significant scientific advances and the presence of new technologies in the field of diagnostic and treatment services, the number of complaints has increased. Research results in the city of Isfahan indicate this upward trend in the number of complaints, so that the number of complaints from the medical staff has increased from 62 cases referred to the Forensic Medicine Organization of the province in 2005-108 cases in 2009. In this study, the highest number of complaints was as follows: General practitioners, anesthesiologists, obstetricians, general surgeons, orthopedists, and nurses. In this study, midwives were ranked 18<sup>th</sup> and in other words 5.8% of the frequency of complaints among health-care providers and gynecologists were ranked 3<sup>rd</sup> and 8.3% of the frequency of complaints.<sup>[1]</sup> A study in Australia also found that midwives and gynecologists pay a portion of the highest premiums for liability insurance, or about 18%. Midwives and gynecologists, on the other hand, make up only about 2% of the group of physicians and paramedics.<sup>[6]</sup>

However, despite the problems caused by the error, especially in the field of midwifery, how can it be prevented?

The issue of improving the quality of education in medical sciences has always been considered and is becoming

more and more important. The health-care system is very dynamic today and traditional teaching methods are challenging.<sup>[7]</sup> Achieving professional standards in medical sciences, including midwifery, is achieved by achieving the goals of theoretical and clinical skills of the profession.<sup>[8]</sup> The profession of midwifery is a well-known practice based on practice, while many studies speak of the gap between theory and practice in the clinic.<sup>[9]</sup> Today, midwifery education is a topic of discussion in many countries. One of the first educational needs is to adopt new policies and methods to empower and improve the performance of midwives. Since midwives are a member of the medical community whose goal is to promote maternal and infant health and to play a role as a skilled and active member, the education of this group is of particular importance.<sup>[10]</sup> In recent years, education through evidence-based care has been emphasized by health system policymakers as a way to improve the education of care standards and improve health services. Studies have shown that midwives who base their practices on scientific evidence have been able to make better decisions and provide higher quality care for the patient and the organization. This highlights the importance and place of using clinical guidelines and guidelines.<sup>[11]</sup> The use of clinical and educational guidelines is in fact an attempt to apply the results obtained from scientific methods, especially in evaluating the evidence related to the advantages and disadvantages of health services. The use of clinical guidelines leads to the same treatment for a similar disease in different places and conditions. This increases the accountability of health-care providers. With the use of clinical guidelines, correct, appropriate, and agreed coping strategies are identified and clarified, and medical errors are reduced. In fact, when guidelines are implemented, improving the quality of health care is based on best practice and cost reduction. This not only reduces the side effects of the error for the patient and the system, but also provides a safer environment for service providers and in turn, improves the quality of service delivery.<sup>[12]</sup> Azmoude *et al.* in their study for better management of pregnant mothers with thermal, emphasize a team approach and evidence-based care to improve the quality of midwifery services.<sup>[13]</sup> Examining the common mistakes in midwifery students by experts in this field and providing scientific solutions for managing these mistakes can be used as the same guide to teach dealing with common midwifery mistakes in educating students. As a result, emergency problems are prevented, which often follow the simplest medical errors. Providing these results can reduce maternal mortality, morbidity, and treatment interventions, and the stress and job stress of midwives. Thus, health services are effectively provided to the two vulnerable groups of mother and baby. Therefore, the purpose of this study is to teach clinical error management to midwifery students.

## Methods

The present study was conducted using consensus-based methods with the aim of examining the opinions of experts based on the Delphi technique in Shahid Sadoughi University of Medical Sciences in Yazd in 1397. Delphi can be considered as a way to structure a group communication process. This process allows group members to solve a complex problem more effectively.<sup>[14,15]</sup> In this way, without the need for the physical presence and meeting of the participants, a group of experts express their views on a set of hypotheses under study. The set of hypotheses is distributed among the participants. Their anonymity to other participants allows them to determine the importance and priority of the hypotheses proposed. This iterative process continues until a consensus is reached on the hypotheses. Thus, the Delphi method is a process of group communication with a relatively strong structure and expert judgment on topics about which, naturally, there is not enough knowledge.<sup>[16]</sup> There is no standard for panel size in Delphi studies. The panels are made of almost any size. Panels with <10 and above 1000 people are rare. Typical panels appear to be in the range of 10–100 people and consist of two or three groups of experts. Researchers should pay as much attention as possible to the balance of membership in expert groups.<sup>[17]</sup> The selection of specialists in the present study was purposeful and based on their expertise in the areas of student care and work experience. Data saturation was performed in the presence of 21 experts (including faculty and no faculty members). To conduct the study, researchers first conducted library studies and examined the death records of mothers in medical and forensic organizations. Finally, after surveying faculty members and experts, the initial Delphi questionnaire was prepared on the subject of medical errors in students. Therefore, three questionnaires were proposed and adjusted according to the different professional fields of midwifery students, “delivery room, prenatal care, gynecological diseases.”

Data collection stage: Researcher to perform the first round of Delphi using questionnaire No. 1 (including areas of pre-pregnancy care, pregnancy, postpartum, clinic, labor, postpartum, postpartum, hospital, women diseases) collected the opinions of experts with the aim of identifying errors and suggested solutions. Data analysis methods vary according to the purpose of studying the Delphi technique, the structure of the cycles, the type of questions and the participating members. Content analysis techniques are commonly used to identify topics that are measured by an initial questionnaire that lacks a collection structure. In the next round, this questionnaire will be transformed into a structured questionnaire that will form the basis of the next rounds. The data of the second round and the next rounds, which are of a quantitative nature, are analyzed using quantitative

statistical methods. The third and subsequent periods should indicate the distribution of samples from previous periods.<sup>[17]</sup> In the present study, the information collected in the first round was completely recorded and analyzed by the researchers of the qualitative content of the contract. Based on the opinions of the participants of the second round of the Delphi questionnaire, Questionnaire No. 2 was designed as a Likert score according to the importance of the error and the effectiveness and implementation of the mentioned solutions. In the second round questionnaire, an open question was considered by the participants to mention new cases. The goal of the second round was to achieve data saturation in relation to the most important errors and the most effective and practical solution to reduce the incidence of errors. After the second round of Delphi, the draft of the second stage questionnaire was compiled by calculating the average score of errors and suggested solutions. In the third and final round of Delphi, the errors mentioned in the studied areas (prepregnancy care, pregnancy care, labor care, postpartum care, postpartum care in hospital and clinic, gynecological diseases, and contraceptive methods) were prioritized and mentioned based on the importance (based on the average score) and the proposed solutions were prioritized and mentioned based on the impact (based on the average score). Participants in the study were asked to give their opinion for or against. The goal of the third round was to achieve the final data saturation in relation to the most important errors and the most effective solutions. According to the Delphi process, the percentage of agreement with the scope and items of the questionnaire was 75% or more. In the present study, in order to maintain the ethics and confidentiality of experts and respondents, the questionnaires were completed with an identification code. Descriptive statistical methods and SPSS-18 software (Statistical Package for the Social Sciences) were used to summarize and announce the agreement.

Two group discussion sessions were held with the presence of faculty and no faculty instructors of the midwifery department and the opinions were summarized based on the latest midwifery scientific sources and the list of management methods for each medical error was completely determined. Finally, after the final conclusion, an educational clinical guide for error management in midwifery students was developed.

## Results

A total of 21 experts participated in the present study. Data saturation in participants in different Delphi courses was as follows: The presence of 21 people in the first round of Delphi (16 faculty instructors, 5 health-care staff responsible for student education), the presence of 18 people in the second

round (14 faculty instructors, 4 Staff), and the presence of 15 people in the third round (11 faculty members, 4 staff). The age range of participants was 37–58 years with a mean age of  $42/5 \pm 5/3$  years. The majority of the participants in the study had a master's degree or higher (74%) and the rest had a bachelor's degree, 81% of them were faculty members. All people answered all the questions in the first round (100%). The information and opinions collected by experts in the first round were done using qualitative content analysis. Seventy-five errors and 210 suggested solutions (2–3 solutions for each error) were extracted, which were the basis of the second round questionnaire. The goal of the second round was to achieve data saturation in relation to the most important errors and the most effective way to reduce the incidence of errors. The second round was completed by 18 experts. Forty-one errors and 86 solutions (2 solutions for each error) received the highest average score [Table 1]. The goal of the third round was to achieve the final data saturation in relation to the most important errors and the most effective solutions. The third round was completed with 15 specialists. The errors of each domain were prioritized based on the degree of importance and the desired solution, based on the degree of impact. According to the number of reported errors, out of a total of 41 errors, 19 errors were related to clinical care errors [Table 1] and 22 errors were related to hospital care errors [Table 2]. The errors were: 2 errors in the field of prenatal care, 6 errors in the field of prenatal care, 13 errors in the field of labor care, 6 errors in the field of obstetric care, 3 errors in the field of postpartum care in the hospital, 2 errors in the field of post-partum care in health centers, 3 errors in the field of counseling and contraceptive methods, and 6 errors in the field of gynecological diseases. For each error, 2–3 suggested solutions received the highest average score in terms of impact. Finally, after finalizing the opinions, the researchers drafted a clinical training guide for error management in midwifery students based on the most important errors and suggested solutions. After holding two group discussion sessions with the presence of faculty and nonfaculty instructors of the midwifery group, the opinions were summarized and approved based on the latest scientific sources of midwifery.

## Discussion

International reports in recent years in various countries indicate that, unfortunately, despite significant scientific advances in the field of diagnostic and treatment services, the number of complaints against physicians and paramedics has increased.<sup>[18]</sup> The results of a study showed that out of 708 cases of medical malpractice lawsuits in 2014 among medical staff, the second highest number of complaints and malpractice lawsuits were related to gynecologists with 59 complaints among

physicians and midwives with 41 complaints among paramedics.<sup>[1]</sup> In another study, the most common reasons for women to go to health centers for the treatment of reproductive system problems. It was followed by the highest number of complaints about the obstetrics and gynecology profession.<sup>[19]</sup> Interestingly, a significant proportion of these medical malpractices has been related to avoidable issues,<sup>[20]</sup> so that more than 61% of them can be prevented with careful planning.<sup>[21]</sup> Lack of clinical skills of gynecology, obstetrics, and midwifery students after graduation seems to be one of the reasons for the increasing prevalence of medical malpractice.<sup>[17]</sup> Therefore, due to the increase in complaints of medical malpractice in the field of obstetrics and gynecology and midwifery, in order to increase the job security of medical staff, it is necessary for midwives to prevent various medical malpractices by taking measures according to scientific standards and protocols. Furthermore, performing actions according to scientific standards and protocols and increasing skills can maintain the health of mothers and infants.<sup>[17]</sup> According to the results of the present study, the highest number of errors in the field of hospital care was related to intra-labor care. This shows the great importance of care during labor and delivery, as well as providing quality and error-free services to mother and baby. The study of Beigi *et al.* examined cases of negligence in medical system organizations. The results showed that the high rate of midwifery negligence is in the delivery stage and immediately after delivery.<sup>[22]</sup> In addition, the highest number of errors reported in the field of clinical care was related to the field of prenatal care. The study of Azimi *et al.* also examined the negligence of the gynecology and midwifery profession, the results showed that most complaints of negligence in this profession are related to pregnancy and childbirth.<sup>[23]</sup> In the study of Gómez-Durán *et al.*, out of 7237 cases with medical malpractice cases related to midwifery and women, 885 cases were related to pregnancy and childbirth.<sup>[18]</sup> The results of various studies of gynecological and obstetric cases with negligence claim show that the most complications leading to complaints are related to the stage of pregnancy and childbirth, infant death, and neurological complications of the fetus and maternal death. It seems that the most important reasons for such complaints are: Errors such as not correctly diagnosing gestational age, not performing proper examinations and care during pregnancy, failure to refer high-risk pregnant women in time, not distinguishing pathological from physiological cases in pregnancy.<sup>[23-25]</sup> Most of the cases mentioned above were also mentioned in the present study as common mistakes in students. Some of the important errors reported in the present study were: Failure to review the indications and contraindications of treatment methods and drugs in patients, errors in prescribing drugs, failure to pay attention to the patient's



**Table 1: Results of the second and third rounds of Delphi clinical care technique**

Area	Error (based on importance)	The average score of the second round	Frequency percentage in the second round		Proposed solution (based on impact)	The average score of the third round	Frequency percentage in the third round	
			I agree	I disagree			I agree	I disagree
Prenatal care	Lack of mastery in diagnosing high-risk cases and timely referral	4.75	100	0	Teaching case-based prenatal care	4.75	100	0
					Use of prepregnancy diagnostic algorithms in educating students	3.90	25	75
Pregnancy care	Lack of mastery in providing correct advice and determining the appropriate time to discontinue contraception	4.5	100	0	Teaching the steps of counseling patients using the principles of counseling	4.75	37.5	62.5
					Use training sessions to prepare counseling scenarios	4.25	100	0
	Lack of mastery in the correct measurement of vital signs	5	75	25	Instructor monitoring and re-monitoring in the first few cases of vital signs check	5	56.2	43.8
					More emphasis on vital signs in the Principles and Techniques Internship Unit	4.5	87.5	12.5
	Lack of proper interpretation of paraclinical reports and fetal health assessment	5	100	0	Use of diagnostic software that provides various results of paraclinical cases to increase the power of analysis and interpretation of the student	4.15	100	0
					Use of algorithms and training charts that can be installed in training environments	3.25	62.5	37.5
	Incomplete history and failure to pay attention to key points in the diagnosis of pregnancy disorders	4.95	68.8	31.2	Obtain patient history reports from the student in charge of the patient before attempting to provide services	5	62.5	37.5
					Obtaining written and corrected student biographies and providing continuous feedback until reaching an acceptable stage	5	68.8	31.2
	Inability to differentiate the causes of pelvic and abdominal pain	9.95	56.2	4.95	Case and problem based evaluation	4.5	81.2	18.8
					Provide real clinical cases and hold case-based meetings	4.25	87.5	12.5
Lack of mastery in performing Leopold maneuvers correctly	4/70	43.8	4.70	Perform step-by-step maneuvers on pregnant mothers under the supervision of an instructor to increase skills	4.75	18.5	81.2	
				View real videos of maneuvers at different ages of pregnancy	4.5	87.5	12.5	

Contd...

Table 1: Contd...

Area	Error (based on importance)	The average score of the second round	Frequency percentage in the second round		Proposed solution (based on impact)	The average score of the third round	Frequency percentage in the third round	
			I agree	I disagree			I agree	I disagree
	Perform periodic prenatal care regardless of the patient's history and past care	4.50	50	4.50	Requiring the student to comprehensively review the history and previous care of the mother comprehensively and report to the instructor	4.75	75	25
					Careful supervision of the instructor at the beginning of prenatal care in the first few caregivers	4.5	62.5	37.5
					Expressing the importance of the patient's past history and the importance of follow-up by expressing the progression of diseases and the consequences of pregnancy in a case-based manner	4.5	87.5	12.5
Postpartum care in health centers	Lack of mastery in providing the most appropriate method of prevention	4.75	75	25	Emphasize and provide case-based training based on national guidelines for contraception	4.75	56.2	43.8
					Discussion about the real cases in the apple system in the free time of internships	4.25	75	25
					Failure to pay attention to immediate danger signs and failure to perform examinations	4.5	100	0
Counseling and providing methods of contraception	Failure to provide an appropriate method of contraception based on the indications and contraindications of the relevant method	4.75	100	0	Request to submit a report of the mother's physical examination by the student to the instructor	4.75	75	25
					Provide the importance of immediate danger signs in the postpartum period and related consequences	4.5	87.5	12.5
					Use of counseling forms containing indications and contraindications for beginner students	4.75	100	0
	Lack of skill in performing IUD placement	4.5	100	4.5	Conducting continuous workshops based on case prevention methods	4.5	100	0
					Preparation of practical and tangible models for more practice	4.75	100	0
					Identify health centers with the most references for IUDs through the provincial health center	4.5	100	0

Contd...

Table 1: Contd...

Area	Error (based on importance)	The average score of the second round	Frequency percentage in the second round		Proposed solution (based on impact)	The average score of the third round	Frequency percentage in the third round	
			I agree	I disagree			I agree	I disagree
Women diseases	Failure to follow the correct principles in contraceptive counseling	4.5	100	4.5	Holding continuous workshops based on case prevention methods in several stages in stages (introductory and advanced)	4	100	0
					Add a unit of principles of counseling with a fertility approach to the topic of midwifery	4	50	50
					Changing the teaching method of prevention methods and holding meetings in a student-centered and interactive way	4	75	25
	Lack of proper communication skills	4.75	75	25	Adding a course based on the principles of patient counseling and emphasizing basic skills	4	37.5	62.5
					Holding introductory to advanced periodic application workshops on consulting and communication skills	3.5	100	0
					Preparation of list of indications and contraindications for common drugs in gynecological clinics by students	4	87.5	12.5
	Lack of control over the indication and contraindication of high-consumption drugs	4.75	100	0	The use of active and student-centered learning methods in pharmacology education due to the volatility of the discussion	3.5	87.5	12.5
					Failure to provide the necessary training on how, risks and interventions of prescription drugs	4.75	93.8	6.2
	Failure to perform a thorough examination and forgetting to touch places such as nipples and...	4.5	75	25	Emphasis on the importance of interventions and risks of medications by the instructor	3.75	56.2	43.8
					Review the steps of performing a breast examination before performing under the supervision of an instructor	4.5	62.5	37.5

Contd...

Table 1: Contd...

Area	Error (based on importance)	The average score of the second round	Frequency percentage in the second round		Proposed solution (based on impact)	The average score of the third round	Frequency percentage in the third round	
			I agree	I disagree			I agree	I disagree
					Preparing a breast examination checklist by specifying the minimum examination by the instructor	4.5	75	25
	Lack of breast examination skills in obese people	4.5	25	75	Using models with the mentioned condition to increase skills	4.5	68.8	31.2
					Perform the examination under the close supervision of the instructor	4.5	25	75
	Error in the scientific spelling of the names of drugs	4.5	100	0	Holding practical and active copywriting workshops	4.75	100	0
					Receive copies based on internship cases at the end of the internship	4.5	100	0

IUDs=Intrauterine devices

nutritional status, history and clinical records of the patient. The errors mentioned above, if a complication occurs in the patient, can lead to medical malpractice of the reckless type. In this regard, Azimi *et al.*, after examining the medical malpractice cases of gynecologists and midwives, concluded that 43.93% of gynecologists and 28.78% of midwives were convicted of negligence. In other words, midwives and obstetricians did not review the indications and contraindications of any treatment before any diagnostic and treatment procedure and took unnecessary measures.<sup>[23]</sup> It was also mentioned in a study that most mistakes in doctors and midwives are related to carelessness and negligence.<sup>[19]</sup> The results of Kamiab study showed that the most common cause of negligence in the midwifery profession is related to human errors. It seems that more attention should be paid to human errors as the main cause of medical malpractice.<sup>[24]</sup> This shows the importance of paying attention to human error management in midwifery students who will form the future medical staff of the health system. Some errors, if they occur and cause complications in the patient, can lead to medical malpractice in the category of nonobservance of government systems. Among these errors, the following can be mentioned: Performing unprincipled induction of labor and not paying attention to the doctor's prescription, not paying attention to the reporting rules, not understanding the reporting rules in recording reports, errors in writing medications and prescribing to patients. In this regard, several studies, including the study of Beigi *et al.*, Mahmoodabadi *et al.* and Ayoubian *et al.*<sup>[1,20,22]</sup> also confirmed that the highest level of negligence in the midwifery profession is related to

noncompliance with government systems. This issue can indicate the gap in government system training in the education system in the midwifery profession and requires special attention and review in integrated clinical skills training with emphasis on compliance with relevant systems. In the present study, error reduction strategies for managing common errors were mentioned by experts. Among these, the most important strategies were: Supervising instructors while providing clinical services, the impact of items on end-of-course evaluation, making changes in the presentation of educational topics, moving toward active teaching methods, and using intelligent software. This issue indicates the importance of using active education methods in improving the knowledge and quality of services provided to patients. It seems that the time has come for interactive and active methods to replace teacher-centered methods in teaching scientific topics.<sup>[21]</sup> Vafae *et al.* conducted a study to investigate the effect of two approaches of teacher-centered and problem-based education on the incidence of nurses' reporting errors. They concluded that the mean of errors had decreased in both trained groups, indicating a positive effect of training. However, considering that the satisfaction rate in the problem-oriented training group was much higher than the teacher-centered group, it seems that the use of this method for educating nurses has been more popular than other methods.<sup>[26]</sup> Nowadays, in clinical education, the use of modern teaching aids is more and more felt in the clinical education of the midwifery profession. In this regard, Noohi *et al.*, by examining the effect of using mobile software on reducing medication errors, concluded that the use of mobile software in combination with routine clinical



**Table 2: Results of the second and third rounds of Delphi hospital care technique**

Area	Error (based on importance)	The average score of the second round	Frequency percentage in the second round		Proposed solution (based on impact)	The average score of the third round	Frequency percentage in the third round				
			I agree	I disagree			I agree	I disagree			
Care during labor	Lack of complete familiarity with drugs used during labor and side effects, interventions and drug risks	5	87.5	12.5	Requiring students to provide evidence-based evidence of side effects and risks of medications for patients on the same day	4	62.5	37.5			
					Distribution of Stoke drugs in the delivery ward among students step by step during internships to provide mechanisms, uses, side effects, etc.				4	100	0
	Incorrect and unprincipled induction of labor	5	75	25	Provide frequent information and alerts to students about the dangers of misdiagnosis of oxytocin	4.25	62.5	62.5			
					Receive scheduled and step-by-step patient status reports from the student responsible for induction of labor				4.25	37.5	0
	Misinterpretation of the fetal ECG and failure to diagnose risky conditions and fetal distress	5	100	0	Holding intermittent and up-to-date workshops on fetal health	4.5	100	0			
					Request to review and present the final outcome of patients with risky status during labor in the form of internships to other students				4.25	100	25
	Do not listen to the fetal heart for a full minute	5	37.5	62.5	Providing conditions for students to attend internships in review sessions of cases related to errors received by the Medical and Forensic Medicine Commission	4.5	75	75			
					Supervision of coaches				4	25	75
	Failure to comply with the principles of delivery and transformation of patients at the end of the internship	5	100	0	Training of professional standards by trainers and emphasis and supervision of strict implementation	4.75	87.5	12.5			
					Involve students in the delivery process and transform each other in internship shifts				4.60	100	0
	Improper administration of drugs, including determining the dosage, not paying attention to similar drugs, choosing the right crystalloid solution, etc.	4.75	100	0	Students attend a drug store and request a list of similar drugs by students	4.75	100	0			
					Preparation of educational posters related to pharmaceutical products used in the department				4.25	87.5	12.5
					Instructor clinical supervision at the time of medication				4.25	62.5	37.5

Contd...

Table 2: Contd...

Area	Error (based on importance)	The average score of the second round	Frequency percentage in the second round		Proposed solution (based on impact)	The average score of the third round	Frequency percentage in the third round	
			I agree	I disagree			I agree	I disagree
	Perform vaginal examination in cases where it is contraindicated (bleeding, etc.)	4.75	62.5	37.5	Informing students about the need to pay attention to the patient's signs and symptoms and careful evaluation before performing a vaginal examination	4.75	81.2	18.8
					Check the instructor before examining the student	4.5	62.5	37.5
	Lack of mastery in providing care in midwifery emergencies	4.75	100	0	Support and educate learners in emergency situations in bed	4	100	0
					Holding targeted training workshops on the subject of midwifery emergencies, sensitizing learners to midwifery emergencies through intermittent and frequent training in the form of internships	4	75	25
					Use midwifery emergency management training videos	4	100	0
	Not paying attention to the mother's position in the open arch for a long time	4.75	31.2	68.8	Emphasis and clinical supervision of trainers	4.75	87.5	12.5
					Using educational videos to show the physiological process of reducing blood flow in the supine position	4.5	50	50
	Lack of attention to the nutritional status and mobility of the mother during labor	4.75	75	25	Expressing the importance of nutrition by the mechanism of action of insulin and glucose on the physiology of labor	4.75	75	25
					Supervision and emphasis of the coach	4.65	62.5	37.5
	Lack of complete registration of documents and lack of knowledge of reporting rules	4.65	100	0	Practical training in reporting at the Clinical Skills Center in hypothetical cases	4.25	87.5	12.5
					Provide a reporting position on the patient's bedside and receive reports of actions taken for the patient from students as part of the evaluation process	4	100	0
	Lack of proper control of the number, duration, tone of uterine contractions	4.5	75	25	Frequent and accurate clinical training on how to control contractions on the patient's bed by the instructor	5	62.5	37.5
					Using models containing contraction intensity sensors to train and control students' cognition	4.25	25	75

Contd...

**Table 2: Contd...**

Area	Error (based on importance)	The average score of the second round	Frequency percentage in the second round		Proposed solution (based on impact)	The average score of the third round	Frequency percentage in the third round	
			I agree	I disagree			I agree	I disagree
Care during delivery	Lack of attention to inter-professional ethics and lack of cooperation with the staff of the centers	4.5	62.5	37.5	The necessity of observing professional ethics by educators due to the importance of modeling learners	4.40	100	0
					Holding professional value workshops	4.35	100	0
	Injuries caused by unnecessary stretching during delivery on the baby	5	75	25	Lots of practice and practice with emphasis on how to get the baby using the model in practice with fully simulated conditions	4.75	75	25
					Clinical supervision and active presence of the trainer in labor	3.5	62.5	37.5
					Using various educational simulators to practice and increase stitching skills such as cow tongue and...	4.5	87.5	12.5
	Improper perineal repair and lack of attention to its anatomy	5	100	0	Active and student-centered education in anatomy	4.5	62.5	37.5
					Establish a day of neonatal internship to attend intensive care unit and hypothetical determination of Apgar in different neonates	4.75	25	75
	Inaccuracy in determining the Apgar score of the baby immediately after delivery	5	93.8	6.2	Use educational videos with different baby positions to calculate Apgar more accurately	4.25	75	25
					Absence of fetal heartbeat after transfer of the mother to the delivery bed	4.75	100	0
	Lack of proper control of the baby's head when leaving	4.5	75	25	Ensuring the presence of students in the meetings of the system and forensic medicine commissions to create sensitivity in the fetal heart hearing	3.70	50	50
Reassuring learners and creating a stress-free environment during training					4.45	93.8	6.2	
Lack of skill in determining the exact time of transfer of the mother to the delivery bed	4.5	62.5	37.5	Head control training with modeling and delivery simulators	3.65	62.5	37.5	
				Use of delivery simulators to display the crowning status in Noli Par and the appropriate status in Multipar	4.75	62.5	37.5	
				Use a variety of multimedia products such as movies	4.5	75	25	
Immediate postpartum care in the hospital	Lack of control over obstetric emergencies	5	100	0	Training in fully simulated environments	5	75	25

*Contd...*

Table 2: Contd...

Area	Error (based on importance)	The average score of the second round	Frequency percentage in the second round		Proposed solution (based on impact)	The average score of the third round	Frequency percentage in the third round	
			I agree	I disagree			I agree	I disagree
					Preparation of algorithm for prioritization of treatment measures during emergency by students and installation in the delivery room	4.75	62.5	37.5
	Lack of accurate, accurate and timed measurement of vital signs	5	75	25	Emphasis on the importance of vital signs in postpartum by the trainer	4.75	50	50
					Case and random control of vital signs recorded by students by the instructor	4.75	75	25
	Failure to check the health of the urinary system after delivery and lack of control over the patient's urination	4.5	93.8	6.2	Preparation of a checklist of priority activities expected after childbirth by students and installation in the postpartum section	4.25	75	25
					Instructor supervision and control	4.25	25	75

ECG=Electrocardiography

education, is effective on the cognitive dimensions and medication error behaviors of nursing students.<sup>[27]</sup> Furthermore, in some solutions, the use of peer education for clinical education of students was recommended. Today, various studies have emphasized the role and impact of this method in the clinical education of the midwifery profession. Hatami Rad *et al.* conducted a study entitled "The effect of using the teacher-centered teaching method and peer education in improving some clinical skills of midwifery students" showed that the practical skills scores of students who used the peer education method were similar to those of the peer education group. This shows that this method can be as effective as teaching by teachers, so they suggested that in teaching midwifery students at the clinical skills center, higher semester students should be used as a counterpart in learning clinical skills.<sup>[28]</sup> Safari *et al.* also designed a study entitled "Comparison of midwifery students' satisfaction with teaching gynecology and infertility through lectures and peer education." The results of this study showed that the use of new and active educational methods has a significant effect on increasing the interest in learning and motivation in students.<sup>[29]</sup> Therefore, in order to improve and enhance clinical midwifery education, it is recommended to use various teaching aid methods. Finally, the results of the opinions of experts in the present study were prepared in the form of a clinical educational guide for error management in midwifery students and for use in midwifery training groups. The

use of evidence-based guidelines improves health-care standards, helps improve clinical outcomes, and even improves health economics outcomes.<sup>[30]</sup> Various studies emphasize the need for clinical guidance and its role in improving health care. One of them is the research of Grando *et al.* Entitled "Creating a purposeful framework for developing clinical guidelines to reduce medical errors." In their study, Grando *et al.* suggested that by creating evidence-based clinical guidelines, a large number of recurring medical errors could be prevented and a targeted improvement in patient care provided.<sup>[31]</sup> The most important strength of the present study was the emphasis on students' clinical errors in different clinical areas and fields separately and the use of experienced professionals in each field that could help report the most important student errors. The disadvantage of the present study was the lack of use of students' opinions and reports regarding the most important errors, because the use of self-report is one of the basic principles in controlling the occurrence of re-errors. Therefore, it is suggested that in future studies, learners' perspectives be used to prepare instructions and educational packages. We hope that paying attention to the common mistakes of students and the proposed solutions that have been collected in this clinical guide based on the opinions of experts, and by providing training conditions for error management and careful planning to improve the quality of midwifery education can lead to good results to reduce errors and negligence in the midwifery profession.

## Conclusion

According to the results of the present study, the highest number of errors in the field of hospital care was related to the field of intra-labor care, which indicates the serious importance of intralabor and delivery care and providing quality and error-free services to mother and baby. Furthermore, the highest number of errors reported in the field of clinical care was related to the field of prenatal care. In the present study, error reduction strategies for managing common errors were mentioned by experts. The most important strategies were: "Supervising educators while providing clinical services, the impact of items on end-of-course evaluation, making changes in the presentation of educational topics, moving toward active teaching methods and the use of intelligent software." This issue indicates the importance of using active education methods in improving the knowledge and quality of services provided to patients.

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## Conflicts of interest

There are no conflicts of interest.

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