CC BY

Effect of Medication Administration Training on Midwives' Practices

Heba Hamoud Alomrani[1]*, Eman A. Fadel[2], Hanan El-Sayed Mohamed El-Sayed[3], Amina Mohamed Rashad EL-Nemer[4]

[1] Nursing Specialist in Maternity and Children Hospital in Tabuk (Master Science in Nursing 2022
[2]Professor of Woman's Health and Midwifery Nursing, Faculty of Nursing Mansoura University- professor of Woman's Health and Midwifery Nursing Faculty of Nursing, Mansoura National University

[3]Professor of Woman's Health and Midwifery Nursing , Faculty of Nursing, Mansoura University, Egypt

[4]Professor of Woman's Health and Midwifery Nursing, Faculty of Nursing, Mansoura University,
Email: Draminaelnemer@mans.edu.eg

Abstract
Background: Providing an optimal high quality of care to the women and their fetus, requires ensuring safety and harmless practice with upholding ethical standards. Aim: It was conducted to determine the effect of medication administration training on midwives' practice. Design: A pre/post-quasi-experimental research design was used in this study. Sample: A convenient sample of 92 midwives was utilized. Setting: postpartum unit at Maternity and Children Hospital in Tabuk Saudi Arabia. Tools: two tools were used; 1) Midwives' general characteristics, and 2) Midwives' Medication Administration Observational Checklist. Results: Dramatic enhancement in the total mean score of midwives' practices concerning medication administration from 14.1% (pre-training) to 93.5% (post-training) with highly statistically significant differences. Conclusion: Providing medication administration training was highly effective in enhancing the midwifery practice. Recommendation: Applying a comprehensive training to improve the midwifes' practices during medication administration.

Keywords: karst; carbonate reservoir; production logging tool (PLT); Mishrif Formation; Zubair Oil Field; lost circulation; reservoir heterogeneity; collapse breccia; managed pressure drilling; water breakthrough; Iraq.

1. Introduction

Medication administration is considered one of the main midwives' main procedures. It is an imperative part of providing qualified cares. The midwife should track the standard guidelines to improve the safety of medication administration. Medication administration has been assessed to consume about 40% of nursing practices' time. It is one of the core midwives' procedures in healthcare settings (Hwang & Chang, 2023).

As midwives are the first and most commonly seen health professionals by pregnant women during their routine pregnancy period, a great proportion of pregnant women are followed up during this period by midwives (Lundborg et al., 2024). It has been stated that the health status of a pregnant woman has an important effect on the treatment plan for pregnancy and childbirth. In this respect, if a mistake is made in this treatment, there may be hazards that lead to physical and moral problems for both the woman and the baby. If such a mistake is made by a first-level health professional, the medication administration safety of patients may be decreased (Klein, 2024).

The importance of ensuring medication safety in pregnant women cannot be overstated. It is crucial to carefully consider the potential risks and benefits associated with any medication that is prescribed or recommended during pregnancy (Wesley, Sewell, Chang, Hatfield, & Nguyen, 2021). The well-being and health of both the mother and the developing fetus should always be the primary concern. Consequently, it is important for healthcare providers and pregnant women to collaborate closely and make informed decisions about medication use. By prioritizing safety, we can significantly reduce any potential harm and promote the overall well-being of pregnant women (Weld, Bailey, & Waitt, 2022).

Worldwide, midwifes are trained on clinical policies and guidelines for the medication administrations in every healthcare settings (Vaismoradi, Tella, Logan, Khakurel & Vizcaya-Moreno, 2020). It is the midwife's role to deliver the highest quality of care and patients' safety. It comprises the administration of the accurate medications to patients and the quick detecting errors (Brigitta & Dhamanti, 2020). Thus, nurses and midwifes are in the front line in medication administration errors prevention. The 12 medication administration rights include the right drug, right dose, right patient, right time, right route, right assessment, education, right to refuse medication, right indications for prescription, right patient responses, right forms of administration within a given route, and documentation (Hanson & Haddad, 2022).

As with all aspects of midwifery practice, there are several legal and ethical considerations midwives must follow during medication administration. Midwives must be knowledgeable of laws, regulations, and guidelines regarding the prescribing or administration of drugs, and carry a sound knowledge of justice, autonomy, beneficence, and non-maleficence. Various codes of professional conduct and practice, health laws and standards, and case law may also shape these duties and responsibilities in respect of healthcare practice. Midwives should also be guided by national competency standards for the midwife, as well as essential competencies for midwifery practice (Türken,

& Çalım, 2022).

Continuous professional development for midwives in the area of medication administration is important. Becoming a midwife requires a change of registration from an enrolled midwife or registered midwife to a midwife with accreditation requirements surrounding medication. Practicing midwives need to ensure that their knowledge and training are regularly updated to keep in touch of new medication and medication administration guidelines (Dagne, & Beshah, 2021).

Midwives need to maintain their medication knowledge to match their scope of practice and medication endorsement. Opportunities to engage in the practice of midwifery medication administration training and proficiencies may be offered in the form of short workshops, a ready-to-care resource, scope of practice updates within formal re-accreditation for midwives, enabling courses, and postgraduate practice-guided units that have been constructed to formalize medication practice guidelines into learning metrics (International Confederation of Midwives, 2019). Continuing education in medication administration for midwives is a vibrant field, with a range of online courses, workshops, and seminars available through a variety of resources (Watson, 2021).

1.1 Significance of the study

Medication administration is at the essential responsibility of nursing professionals and comprises about 40% of a nurses' workloads. It's a high-risk skill, so clinical quality policies and researchers properly recognize that "nurses are the last line of defense to protect against medication errors". Medication administration errors (MAEs), persist to be one of the principal forms of medical errors that affects patient safeties in healthcare, and are the 3rd leading cause of death. Thus, midwifery training is crucial for developing, maintaining and updating their practices and skills, to confirm that they effectively respond to essential requirements and deliver higher standards of care (Groos et al., 2024).

1.2 Aim of the Study

The present study aimed at determining the effect of medication administration training on midwives' practices.

1.3 Research hypothesis

Significant enhancement in midwives' practices regarding medication administration will be noticed after receiving training than before.

1.4 Operational definitions

Midwives' practices: In this study, it means midwives' practices regarding medication administration.

2. Subjects and Methods

2.1 Research Design

This study used a pre/post-quasi-experimental study design. It was designed depending on an intervention. Typically, the main aim was to assess the extent of an intervention's effect on certain outcomes in absence of randomization. (Miller, Smith & Pugatch, 2020).

2.2 Setting

The present study was applied in a postpartum unit at Maternity and Children Hospital in Tabuk Saudi Arabia. The unit has a 40-bed capacity covered with 92 midwives. It includes two parts; part (A) which is specialized for high-risk cases, and part (B) which is specialized for the more stable cases. Each part is provided with a crash cart and consists of ten rooms; each room has two beds separated by a curtain for privacy and each bed is equipped with an oxygen cylinder, a suction machine, and a call bell to call the midwife.

2.3 Sample

A convenient sample of 92 midwives was utilized.

2.3.1 Sample size

Ninety-two midwives who work in the postpartum unit at Maternity and Children Hospital in Tabuk, Saudi Arabia was utilized considering the following criteria:

Having more than one year experience and haven't administrative role.

The determination of the sample size for examining nurses' understanding of medication administration is based on prior research by Shebl et al. (2020). The sample size was calculated with a precision/absolute error of 5% and a type 1 error of 5%, using the website https://clincalc.com. The formula used is $n= ((\sigma 2(z1-\beta+z1-\alpha/2)2)/((\mu 0-\mu 1)2)$, where $Z1-\alpha/2$ at 5% types 1 error ($p<0.05$) equals 1.96, P represents the expected proportion in the population as indicated by earlier studies, and d is the absolute error or precision. Consequently, the sample size is $n= ((1.22(0.84+1.96)2)/((1.2-0.85)2) =92$. According to this formula, the study requires a total sample size of 92 midwives.

Tools for Data Collection:

Two tools were used in this study for data collection; Tool I: Midwives' general characteristics: it was used to assess midwives' general characteristics, such as age, marital status, educational level, work shift hours, years of experience, and attending training programs related to medication administration.

Tool II: Midwives' Medication Administration Observational Checklist: This tool was adapted from (Fathy, Khalil, Taha & M Abd-elbaky, 2020). It was used for evaluating midwives' practices about medication administration. It included two parts with 35 steps as follows: A- Practices during the preparation of medication (30 steps) such as check the prescription for each drug, wash hands prior to handling medication, double checks the drug name and dosage with the prescription sheet, etc... B- Practices during and after the administration of the drug (5 steps) such as monitor the tasks to the administered medication, records monitoring data related to administered medication, report the abnormal findings to physician, etc.… Scoring system: Each complete and correct "done" step obtained one score, and the "not done" or incorrect action step took a zero score. The satisfactory practice level was ≥80 % and more. And unsatisfactory practice level was < 80 % (Fathy, et al., 2020).

Tools Validity and reliability

Tools were revised by a panel of three experts in the maternity and newborn health nursing fields, the aim of this revision was to test the contents validity, relevance, and the clarity of tools. Recommended modifications were done accordingly. The second tool's reliability was tested by a Cronbach's alpha test, and the resulted reliability was 0.934.

Pilot Study

The pilot study was applied only on a 10% of those who had previous abortions, they were randomly selected (9 midwives). It required to evaluate how understandable the used tools were. Also, it helped in calculating the needed time to fill-in the required forms. No changes were needed and the midwives in the pilot study were later involved in the whole study sample.

2.4 Ethical consideration

Approval to conduct this study was obtained from the Research Ethical Committee of the Faculty of Nursing at Mansoura University, reference number (51/2024). The official endorsement was granted by the director of the aforementioned institution. The researcher engaged with the selected midwives who fulfilled the study's inclusion criteria, explaining the research's purpose to obtain their consent. Also, all midwives who had experienced abortion were given their right to contribute to the study, and assured that they have the right to withdraw from the study at any time without a given reason with no effect on their healthcare. They were guaranteed confidentiality and anonymity during the research process, and it was emphasized that the collected data would be introduced solely for analysis.

2.5 Procedure

This study was implemented in these phases: Planning and designing phase, Initial baseline assessment phase, and Implementation and post the intervention evaluation phase.

The First phase (Planning and designing)

2.5.1 Preparation of the study tools:

2.5.1.1 Preparatory phase:

In this phase, the official permissions to conduct the study was attained from the Research Ethics Committee of the Faculty of Nursing, Mansoura University and from the head of the Educational Management and from the managers of Maternity and Children Hospital in Tabuk Saudi Arabia. The researcher prepared the educational and the training sessions material; preparation of data collection tools and the educational content was based on reviewing national and international literatures related to the topic (Abdelrahman et al., 2020; Thelen, 2022; Vaismoradi et al., 2020).

2.5.1.2 Preparation of the Educational Content:

The researcher reviewed both nationally and internationally scientific literatures related to the many components of the study to design the educational content. The researcher developed a simple Arabic colored booklet after reviewing both Arabic and English literatures. Putting in mind the midwives' culture, the educational booklet was developed at a proper reading understandable level, and in appropriate culture styles. Illustrating images were added to facilitate the midwives' comprehension of contents.

2.5.1.3 Interviewing and assessment phase:

The researcher joined the Maternity and Children Hospital Postpartum Unit in Tabuk, Saudi Arabia 3 days/ week (9 a.m.: 1 p.m.) until the desired sample size was collected. Then, she introduced herself to the midwives, greeted them, checked their legibility for the study, and provided a full clarification of the aims and methods of the study to get their acceptance and co-operation, in addition to the consent. They were selected regarding the previously mentioned inclusion criteria. Then she assessed midwives who enrolled for their eligibility to contribute in the study, the researcher made a list of eligible midwives. After that, a written consent to share in the study was signed by them.

Previous to the intervention, data collection tools were used, 15:20 minutes interview to collect the baseline data from each midwife as age, the marital status, the educational level, her years of experience, working hours, besides, all the midwives were assessed for their knowledge levels regarding medication administration using "midwives' knowledge regarding medication administration process questionnaire" (Tool I) (baseline assessment). Additionally, the midwives practice regarding medication administration using midwives' medication administration observational checklist (Tool II), The researcher registered the last daily attendance and last scores for all the midwives as a baseline assessment for their level of knowledge and practice.

2.5.1.4 Implementation phase:

The researcher asked each midwife for her phone number and gave her contact information. They were told by the researcher that their contact information was used to remind them of the post-intervention, and follow-up data collection date, time, and location of sessions. They also were asked that they can contact with the researcher at any time.

With approval from the hospital director, the training instructional hall was utilized as a teaching room which was air-conditioned with a white-board and projector.

During the intervention, the researcher divided the midwives into 7 subgroups (6 subgroups consisted of 13 midwives and one subgroup included 14 midwives), and four educational sessions for 30 minutes per session (each subgroup completed the 2 sessions/week).

7 subgroups × 2 weeks =14 weeks

The implementation phase was continued for seven weeks. Also, the researcher prepared a group on WhatsApp application for continuous contact with studied midwives to answer their questions after the end of the session, explained any misconception regarding any information in the session and help providing information for those

who missed any session in the hospital. This group helped the researcher and studied midwives for continuous contact and increased their cooperation with the researcher.

The training sessions were covered in 120 minutes (Theoretical and practical) distributed as follow; (4) sessions lasted for (2) weeks (30 minutes for each session), accomplished by using the available resources, the relevant contents, and instructional approaches for all the sessions. Brainstorming, lectures, Instructional media, group discussion, and the booklet prepared by researcher were given to the participants in the 1st day of the training sessions.

The sessions were divided as follow:

The First session: an overview of the educational sessions was provided by the researcher, then received the opinions from midwives regarding the medication administration. The researcher clarified midwives' misapprehensions concerning medication administration. In the end of each session, the studied midwives were encouraged to express their opinions and allowed to share questions and answers. The researcher provided the midwives with the instructional booklet and explained the way to apply it.

The second session focused on the theoretical part which covered the following; introduction and overview on medication administration, medication administration routes, consideration and instruction for actual medication administration, medication administration nursing ethics, medication errors' causes, the side effect of medication errors, and the guidelines to avoid and overcome medication errors. Group discussion, lecture, and sharing questions and answers were used to provide the needed instructions.

The third session: focused on the practical part which included a training session related to medication administration process.

The fourth session focused on revealing any misunderstanding & explanation, terminate sessions through feedback, and conduct the post-test to assess the effect of the educational sessions to assess the result of medication administration training on the performance of midwives.

Statistical design:

All statistical analyses were directed using the SPSS 20.0 (SPSS, Chicago, IL). Continuous data were presented as mean and standard deviation (SD) assuming a normal distribution. Categorical data were represented by the numbers and percentages. In order to compare categorical variables, the Chi-square test was used, either the Fisher's exact test was applied when suitable. For the continuous data; the correlations between variables were assessed using the correlation coefficient test. Also, the internal consistency, or the reliability, of the study's assessment questionnaires was calculated. The resulted p-value of below 0.05 was considered the cutoff point for statistical significance.

Description of the Health Educational Session plan concerning Medication Administration:

Component The description	
The language	Arabic
Introduction	**Emphasized on:** Effect of medication administration training on midwives' performance
participants:	midwives who work in the postpartum unit at Maternity and Children Hospital in Tabuk, Saudi Arabia, having more than one year experience and haven't administrative role been utilized.
Number of sessions	Two sessions per week, every session lasts for (30) minute, 13 midwives for each session except the last subgroup (14 midwives). Training lasted for 2 weeks for each subgroup.
Goal	The sessions aimed to give midwives the needed knowledges and the proper performance regarding medication administration.
Specific objectives	**In the end of the educational sessions, midwives were able to:** - Introduction and general overview on medication administration. - Routes of medication administration. - Considerations and instructions for effective medication administration. - Nursing legal/ethics in medication administration. - Causes of the medication errors. - Side effects of medication errors. - Guidelines to avoid and tackling medication errors. - The practical part related to medication administration process.
Educational materials	Pictures, written materials, videos, and data show.
Methods	Lectures, open group discussion, and demonstration.
Methods of Evaluation	Pre- and post- evaluation test.

Educational Sessions Distribution

Subgroup number	The First Session 1st Week	Participants	The Second Session 1st Week	Participants	The Third Session 2nd Week	Participants	The Fourth Session 2nd Week	Participants
1	Saturday (10 a.m.: 10:30 a.m.)	1 – 13	Monday (10 a.m.: 10:30 a.m.)	1 – 13	Saturday (10 a.m.: 10:30 a.m.)	1 – 13	Monday (10 a.m.: 10:45 a.m.)	1 – 13
2	Saturday (10 a.m.: 10:30 a.m.)	14 – 26	Monday (10 a.m.: 10:30 a.m.)	14 – 26	Saturday (10 a.m.: 10:30 a.m.)	14 – 26	Monday (10 am: 10:45 am)	14 – 26
3	Saturday (10 a.m.: 10:30 a.m.)	27 – 39	Monday (10 a.m.: 10:30 a.m.)	27 – 39	Saturday (10 a.m.: 10:30 a.m.)	27 – 39	Monday (10 am: 10:45 a.m.)	27 – 39
4	Saturday (10 a.m.: 10:30 a.m.)	40 – 52	Monday (10 a.m.: 10:30 a.m.)	40 – 52	Saturday (10 a.m.: 10:30 a.m.)	40 – 52	Monday (10 a.m.: 10:45 a.m.)	40 – 52
5	Saturday (10 a.m.: 10:30 a.m.)	53 – 65	Monday (10 a.m.: 10:30 a.m.)	53 – 65	Saturday (10 a.m.: 10:30 a.m.)	53 – 65	Monday (10 a.m.: 10:45 a.m.)	53 – 65
6	Saturday (10 a.m.: 10:30 a.m.)	66 – 78	Monday (10 a.m.: 10:30 a.m.)	66 – 78	Saturday (10 am: 10:30 a.m.)	66 – 78	Monday (10 a.m.: 10:45 a.m.)	66 – 78
7	Saturday (10 a.m.: 10:30 am a.m.	79 - 92	Monday (10 a.m.: 10:30 a.m.)	79 - 92	Saturday (10 a.m.: 10:30 a.m.)	79 - 92	Monday (10 a.m.: 10:45 a.m.)	79 - 92

RESULTS

Part I: The General Characteristics of Studied Midwives

The researcher depended one of the observation methods (Frequency table and pie chart) to present data regarding demographic characteristics and found the upcoming results:

Table 1. Frequency distribution of the studied midwives according to their demographic characteristics.

Demographic characteristics		**Frequency (N = 92)**	**Percentage (%)**
Age	Less than 25 years	8	8.7
	25 to 35 years	41	44.6
	More than 35 years	43	46.7
Marital status	Married	46	50.0
	Single	33	35.9
	Divorced	9	9.8
	Widowed	4	4.3
Education level	Diploma in nursing	42	45.7
	Bachelor's degree in nursing	50	54.3
Years of experience	Less than one year	6	6.5
	1 to 5 years	35	38.0
	More than 5 years	51	55.4

Table 1 displays that 46.7% of studied midwives were more than 35 years, 50% of them were married and 54.3% have a bachelor degree in nursing. Regarding the years of experience, 55.4% they had more than 5 years of experience. The following is an analysis of receiving medication administration training, medication error occurrence during work, and adherence to medication error reporting among midwives:

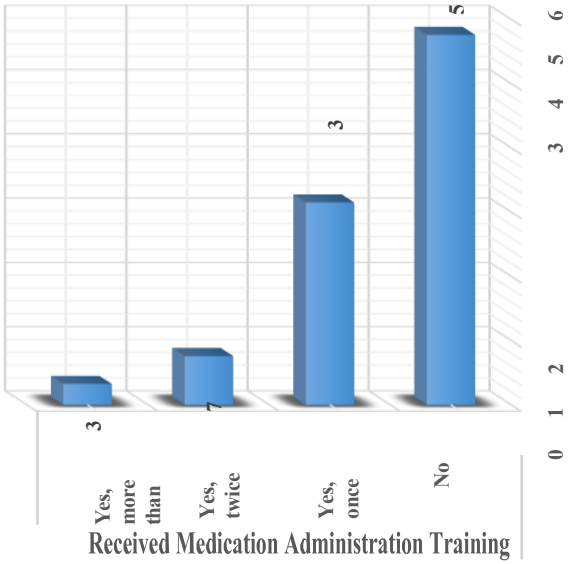


Figure 1. Analysis of receiving medication administration training.

Figure 1 shows the distribution of responses from midwives regarding whether they received medication administration training and how frequently. Most respondents, 57.6%, indicated that they hadn't received any training in medication administration. A considerable proportion, 31.5%, reported having received training once, while 7.6% stated they were trained twice. Only a small percentage, 3.3% had received training more than twice. These findings highlight a significant gap in repeated training opportunities, with nearly 90% of midwives either not receiving any training or having had only a single session. This may raise concerns regarding adequacy and reinforcement of knowledge and skills related to safe medication practices.

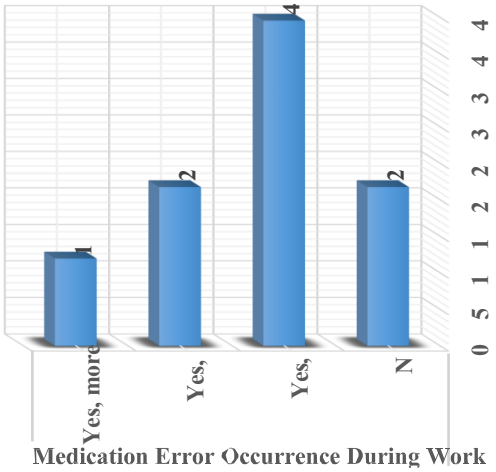


Figure 2. Analysis of medication error occurrence during work.

Figure 2 shows the distribution of midwives' responses regarding the occurrence of medication error during work. The highest percentage among respondents, 44.6% declared that they experienced medication errors once, followed by 21.7% who had not experienced any medication errors. Another 21.7% indicated that they had made a medication error twice, while 12.0% reported having committed such errors more than twice.

These findings suggest that a substantial proportion of midwives have encountered medication errors at least once during their practice, with over threequarters (78.3%) reporting one or more incidents. This emphasizes the need for enhanced safety protocols, continuous education, and error prevention strategies in clinical practice.

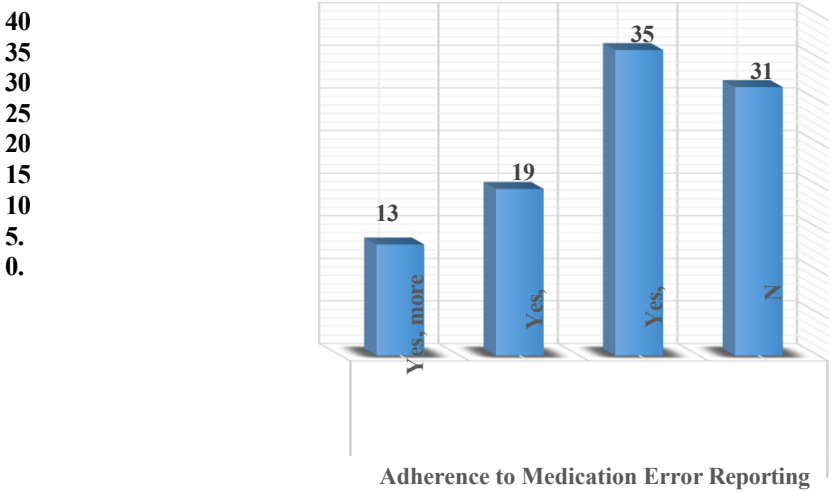


Figure 3. Analysis of adherence to medication error reporting.

Figure 3 illustrates the midwives' adherence to medication error reporting. The results show that 35.9% of the respondents reported a medication error once, while 31.5% stated they did not report any errors. Additionally, 19.6% reported errors twice, and 13.0% indicated they reported medication errors more than twice.
These results indicate that while most midwives 68.5% have reported medication errors at least once, a notable portion 31.5% have never engaged in reporting, which could reflect barriers such as lack of awareness, fear of blame, or absence of supportive reporting system. So, promoting a culture of safety and openness may help improve error reporting practices in healthcare settings.

Table 2. Reported practices during medication preparation among the studied midwives (pre- and post-training).

Sr.	Items	Group	Not Done	Incompletely Done	Done
			No. (%)	No. (%)	No. (%)
1	Checks that there is a valid, clear prescription for each drug on the medication administration record signed by the prescribing doctor.	Before	2 (2.2)	0 (0.0)	90 (97.8)
		After	0 (0.0)	1 (0.01)	91 (0.99)
2	Washing hands prior to handling medication.	Before	4 (4.3)	22 (23.9)	66 (71.7)
		After	0 (0.0)	10 (10.9)	73 (89.1)
3	Prepare a tray for the drug with the necessary equipment for the drug round.	Before	4 (4.3)	21 (22.8)	67 (72.8)
		After	0 (0.0)	13 (14.1)	79 (85.9)
4	Double checks the drug name and dosage with the prescription sheet.	Before	10 (10.9)	20 (21.7)	62 (67.4)
		After	0 (0.0)	22 (23.9)	70 (76.1)
5	Reads the medication prescription without difficulties.	Before	15 (16.3)	22 (23.9)	55 (59.8)
		After	0 (0.0)	32 (34.8)	60 (65.2)
6	Labels the medication.	Before	23 (25.0)	24 (26.1)	45 (48.9)
		After	0 (0.0)	31 (33.7)	61 (66.3)
7	Label syringes and bags with the medication name.	Before	24 (26.1)	23 (25.0)	45 (48.9)
		After	0 (0.0)	35 (38.0)	57 (62.0)
8	Check the expiry date of the drug.	Before	29 (31.5)	24 (26.1)	39 (42.4)
		After	0 (0.0)	36 (39.1)	56 (60.9)
9	Checks the specific instructions regarding administration of certain drugs are adhered to e.g. If medications are favorably ingested on an empty stomach.	Before	42 (45.7)	22 (23.9)	28 (30.4)
		After	0 (0.0)	43 (46.7)	49 (53.3)
10	Checks if the resident has any known allergies.	Before	42 (45.7)	25 (27.2)	25 (27.2)
		After	0 (0.0)	38 (41.3)	54 (58.7)
11	Checks the prescribed time each drug is to be given.	Before	41 (44.6)	23 (25.0)	28 (30.4)

		After	0 (0.0)	45 (48.9)	47 (51.1)

12	Checks when the drug was last administered.	Before	42 (45.7)	23 (25.0)	27 (29.3)
		After	0 (0.0)	35 (38.0)	57 (62.0)
13	Check that the medication is administered at the right time that is not ≥60 min earlier or late.	Before	38 (41.3)	25 (27.2)	29 (31.5)
		After	0 (0.0)	46 (50.0)	46 (50.0)
14	Check the prescribed dose of each drug in the chart.	Before	31 (33.7)	28 (30.4)	33 (35.9)
		After	0 (0.0)	50 (54.3)	42 (45.7)
15	Checks the prescribed route and form of each drug.	Before	34 (37.0)	28 (30.4)	30 (32.6)
		After	0 (0.0)	45 (48.9)	47 (51.1)
16	Use medicine pots, cups or spoons to avoid making contact with the drug.	Before	36 (39.1)	31 (33.7)	25 (27.2)
		After	0 (0.0)	38 (41.3)	54 (58.7)
17	Crushed medicines, the nurse establishes that these have been sanctioned by a medical practitioner or pharmacist. A clean pestle and mortar are used, and it is cleaned after each resident with warm water and detergent and wiped with a dry hand towel.	Before	35 (38.0)	23 (25.0)	34 (37.0)
		After	0 (0.0)	45 (48.9)	47 (51.1)
18	Checked drugs for the same name and strength if in a monitored dosage system.	Before	32 (34.8)	12 (13.0)	48 (52.2)
		After	0 (0.0)	20 (21.7)	72 (78.3)

Table 2 clearly illustrates the positive impact of the training program on midwives' medication preparation practices. The results clearly show an improvement across all listed tasks of post-training. For example, handwashing before handling medication increased from 71.7% to 89.1%, and checking for drug expiry dates improved from 42.4% to 60.9%. A notable rise was also observed in practices such as checking for known allergies, which jumped from 27.2% to 58.7%, and verifying the last time a drug was administered, rising from 29.3% to 62%. The labeling of syringes and medication bags improved from 48.9% to 62%, while more technical aspects, like ensuring correct dosage and form, also saw meaningful increases. These findings suggest that the training had a significant positive impact on midwives' adherence to safe and accurate medication preparation practices.

Table 3. Reported practices during administration of drug among the studied midwives (pre- and post-training).

Sr.	Items	Group	Not Done	Incompletely Done	Done
			No. (%)	No. (%)	No. (%)
1	Verifies the patient's identity prior to administering medication.	Before	31 (33.7)	25 (27.2)	36 (39.1)
		After	0 (0.0)	28 (30.4)	64 (69.6)
2	Communicates information sensitively to the resident prior to and during administration of medication.	Before	31 (33.7)	26 (28.3)	35 (38.0)
		After	0 (0.0)	26 (28.3)	66 (71.7)
3	Demonstrate knowledge related to administered medication with patient.	Before	31 (33.7)	25 (27.2)	36 (39.1)
		After	0 (0.0)	21 (22.8)	71 (77.2)
4	Administered all medicines are personally by the dispensing nurse immediately following preparation.	Before	39 (42.4)	16 (17.4)	37 (40.2)
		After	0 (0.0)	39 (42.4)	53 (57.6)
5	Administers dose correctly.	Before	35 (38.0)	29 (31.5)	28 (30.4)
		After	0 (0.0)	39 (42.4)	53 (57.6)
6	Stay with the resident until the drug has been swallowed.	Before	32 (34.8)	27 (29.3)	33 (35.9)
		After	0 (0.0)	40 (43.5)	52 (56.5)
7	Not to leave medicines for the residents to see if administered at a later time.	Before	28 (30.4)	29 (31.5)	35 (38.0)
		After	0 (0.0)	34 (37.0)	58 (63.0)
	Stay patient for several minutes and observe any	Before	33 (35.9)	16 (17.4)	43 (46.7)

8	allergic reaction.	After	0 (0.0)	22 (23.9)	70 (76.1)

Table 3 presents the reported practices of midwives during drug administration, both before and after receiving training. The results show a significant improvement in safe medication administration behaviors post-training. For instance, verifying patient identity before giving medication improved from 39.1% to 69.6%, and demonstrating knowledge about the administered drug rose sharply from 39.1% to 77.2%. Communication with patients also improved, with 71.7% of midwives sensitively informing residents during administration, up from 38.0% before. Furthermore, staying with the resident until the drug is swallowed increased from 35.9% to 56.5%, and observing for allergic reactions rose from 46.7% to 76.1%. These findings confirm that training had a positive and measurable effect on enhancing midwives' adherence to safe and patient-centered medication administration protocols

.

Table 4. Reported practices after administration of drug among the studied midwives (pre- and post-training).

Sr.	Items	Group	Not Done	Incompletely Done	Done
			No. (%)	No. (%)	No. (%
1	Observe the patients for the occurrence of side effects.	Before	35 (38.0)	21 (22.8)	36 (39
		After	0 (0.0)	45 (48.9)	47 (51
2	Dispose non administered and wasted drugs or sharps in - the appropriate designated sealed container.	Before	34 (37.0)	20 (21.7)	38 (41
		After	0 (0.0)	45 (48.9)	47 (51
3	Monitors the tasks to the administered medication.	Before	30 (32.6)	26 (28.3)	36 (39
		After	0 (0.0)	41 (44.6)	51 (55
4	Documents of any delay or omission in the nursing notes.	Before	25 (27.2)	30 (32.6)	37 (40
		After	0 (0.0)	35 (38.0)	57 (62
5	Sign their usual abbreviations on the medication administration record / prescription sheet as soon as the medication has been administered.	Before	32 (34.8)	28 (30.4)	32 (34
		After	0 (0.0)	41 (44.6)	51 (55
6	Records monitoring data related to administered medication.	Before	29 (31.5)	30 (32.6)	33 (35
		After	0 (0.0)	39 (42.4)	53 (57
7	Reports on the abnormal findings of physician.	Before	37 (40.2)	31 (33.7)	24 (26
		After	0 (0.0)	44 (47.8)	48 (52
8	Make sure that information is soundly understood by patients.	Before	38 (41.3)	29 (31.5)	25 (27
		After	0 (0.0)	45 (48.9)	47 (51
9	Cleans their hands between residents.	Before	32 (34.8)	14 (15.2)	46 (50
		After	0 (0.0)	40 (43.5)	52 (56

Table 4 highlights the reported post-administration practices among midwives before and after training. The data reveal marked improvements in all areas after the intervention. For example, observing patients for side effects increased from 39.1% to 51.1%, and proper disposal of wasted medication or sharps improved from 41.3% to 51.1%. Similarly, documentation of delays or omissions rose from 40.2% to 62.0%, and timely signing of the medication record increased from 34.8% to 55.4%. Notably, reporting abnormal findings to the physician improved from just 26.1% before training to 52.2% after. Additionally, ensuring that patients understand the information provided increased from 27.2% to 51.1%. These results clearly indicate that the training positively influenced midwives' adherence to essential post- medication safety protocols.

Table 5. Total score of the midwives' practices regarding medication administration process (pre- and post-training).

Midwives' Practices	Pre-training N (%)	Post-training N (%)
Unsatisfactory Practices	79 (85.9)	6 (6.5)
Satisfactory Practices	13 (14.1)	86 (93.5)

Table 5 illustrates a striking improvement in the overall perceptions of midwives' practices related to medication administration after receiving training. Before the training, most midwives 85.9% demonstrated unsatisfactory practices, while only 14.1% were rated as satisfactory. However, following the training, this trend reversed significantly, with 93.5% of midwives achieving satisfactory performance, and only 6.5% remaining

unsatisfactory. This substantial shift highlights the positive impact of the training program in enhancing midwives' competencies and adherence to proper medication administration protocols. Also, Figure 4 shows this:

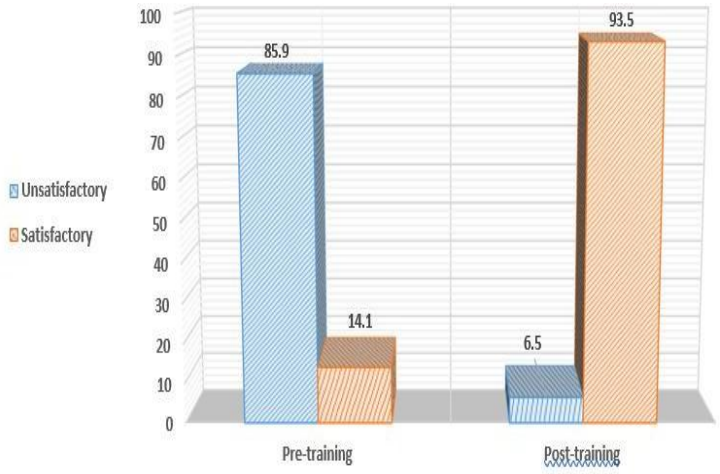


Figure 4. Total score of the midwives' practices regarding medication administration process (pre- and post-training).

Part III: The Associations

Table 6. Association between the demographic characteristics of the midwives and the total midwives' practices score.

Demographic Characteristics		Total Practices Score				Chi-square / Fisher's Exact (P-value)
		Unsatisfactory N = 13		Satisfactory N = 79		
		N	%	N	%	
Age	Less than 25 years	7	0.5	1	0.0	.027 (.986)
	25 to 35 years	35	2.7	6	0.1	
	More than 35 years	37	2.8	6	0.1	
Marital status	Married	41	3.2	5	0.1	1.993 (.574)
	Single	27	2.1	6	0.1	
	Divorced	7	0.5	2	0.0	
	Widowed	4	0.3	0	0.0	
Education level	Diploma in nursing	37	2.8	5	0.1	.315 (.574)
	Bachelor's degree in nursing	42	3.2	8	0.1	
Years of experience	Less than one year	5	0.4	1	0.0	.529 (.768)
	1 to 5 years	29	2.2	6	0.1	
	More than 5 years	45	3.5	6	0.1	

Table 6 indicates no statistically significant association between midwives' total practices score and their age, marital status, education level, or years of experience ($p > 0.05$ for all variables). This suggests that these demographic characteristics did not appear to influence whether midwives achieved satisfactory or unsatisfactory practice scores.

Table 7. Association between medication training, errors, and reporting compliance among midwives and the total midwives' practices score.

Demographic Characteristics	Total Practices Score				Chi- square (P-value)
	Unsatisfactory N = 13		Satisfactory N = 79		
	N	%	N	%	

	No	53	4.1	0	0.0	69.833
Received Medication Administration Training	Yes, once	26	2.0	3	0.0	(.000)
	Yes, twice	0	0.0	7	0.1	
	Yes, more than twice	0	0.0	3	0.0	
Medication Error Occurrence During Work	No	7	0.5	13	0.2	54.501 (.000)
	Yes, once	41	3.2	0	0.0	
	Yes, twice	20	1.5	0	0.0	
	Yes, more than twice	11	0.8	0	0.0	
Adherence to Medication Error Reporting	No	29	2.2	0	0.0	84.216 (.000)
	Yes, once	33	2.5	0	0.0	
	Yes, twice	17	1.3	1	0.0	
	Yes, more than twice	0	0.0	12	0.2	

Table 7 shows a significant relationship between midwives' total practices score and three factors: receiving medication administration training, occurrence of medication errors during work, and adherence to error reporting ($p < 0.001$ for all). Midwives with satisfactory practice scores were more likely to have received training (especially twice or more), reported fewer medication errors, and demonstrated higher adherence to reporting errors compared to those with unsatisfactory scores.

Table 8. Comparison of total practices regarding medication administration among the midwives (preparation, during administration, after administration) pre- and post- training.

Paired Differences					
The variable	**Source**	**Mean ± SD**	**T-tests**		**Partial Eta Squared (η^2)**
			Value	**Sig.**	
Midwives' practices during preparation of medication	Pre-Training	39.17 ± 6.23	- 4.031	.000	.151
	Post-Training	43.53 ± 5.00			
Midwives' practices during administration of medication	Pre-Training	16.25 ± 5.04	- 5.096	.000	.222
	Post-Training	20.51 ± 3.29			
Midwives' practices after administration of medication	Pre-Training	18.16 ± 4.56	- 5.157	.000	.226
	Post-Training	22.14 ± 3.30			
Partial Eta Squared: (0.01: Small effect size, 0.06: Medium effect size, 0.14: Large effect size)					

Table 8 shows that the mean score for midwives' practices during the preparation phase improved significantly after training, rising from 39.17 ± 6.23 before training to 43.53 ± 5.00 after. This difference was statistically significant ($p = .000$), with a large effect size ($\eta^2 = 0.151$), indicating that the training had a meaningful positive impact on improving preparation-related practices. During the medication administration phase, the average practice score increased from 16.25 ± 5.04 before training to 20.51 ± 3.29 after training. This improvement was also statistically significant ($p = .000$), with a large effect size ($\eta^2 = 0.222$), suggesting a strong influence of the training on enhancing midwives' behaviors while administering medication. For post-administration practices, scores rose from 18.16 ± 4.56 before training to 22.14 ± 3.30 after. This change was highly significant ($p = .000$) and had a large effect size ($\eta^2 = 0.226$), reflecting a substantial improvement in how midwives handled post-medication procedures as a result of the training intervention.

Table 9. Comparison of total practices regarding medication administration among the midwives pre- and post-training.

Paired Differences					
The variable	**Source**	**Mean ± SD**	**T-tests**		**Partial Eta Squared (η^2)**
			Value	**Sig.**	
Midwives' Practices	Pre-Training	73.59 ± 11.00	-6.229	.000	.299
	Post-Training	86.18 ± 9.42			
Partial Eta Squared: (0.01: Small effect size, 0.06: Medium effect size, 0.14: Large effect size)					

Table 9 presents the comparison of total medication administration practices among the midwives studied before and after the training. The results show a significant improvement in overall performance, with the mean score rising from 73.59 ± 11.00 before training to 86.18 ± 9.42 after training. This difference was statistically significant ($p = .000$) with a large effect size ($\eta^2 = 0.299$), indicating that the training program had a strong and positive impact on enhancing the midwives' overall medication administration practices.

Discussion

The goal of the current study was to determine the effect of medication administration training on midwives' practice. The results proved a research hypothesis concerning midwives' practices. It was showed that medication administration training significantly improved the level of practice of midwives after the training than before. This indicates that well and comprehensive structured training session were effective in enhancing the level of practice of midwives. This study findings may be attributing the training session make the studied midwifes hand on approach allowed them to practice medication administration on controlled environment in which the practical experience of the training session transfer from the theoretical knowledge into performance.

Prior to the intervention, several critical safety behaviors were performed inconsistently, exposing patients to unnecessary risks. Following the training, however, there was a marked improvement across all assessed practices, underscoring the effectiveness of structured education in reinforcing safe and patient-centered care. Also, one of the most notable improvements was observed in verifying patient identity before medication administration which considered as a fundamental safety step aligned with the "five rights" of medication administration and international patient safety goals.

In the present study, the midwives' Practices include practices before, during and after medication administration process. The findings of the present study demonstrated that the training sessions had substantial positive impacts on midwives' practices related to medication administration, with notable improvements observed across all assessed tasks. Prior to training, adherence to essential safety measures such as handwashing before handling medications and checking drug expiry dates was suboptimal, reflecting gaps in basic infection control and pharmacological safety practices. Post-training, these rates improved highlighting the effectiveness of the training in reinforcing critical aspects of safe practice.

Midwives reported practices during drug administration revealed substantial improvements following the training intervention. Before training, many midwives demonstrated unsafe or incomplete practices such as administering medications without verifying patient identity, not checking drug expiration dates, neglecting documentation after administration, not adhering to the "five rights" of medication administration, and not following double-checking procedures for high-alert drugs; however, the post-training results show significant positive changes in key aspects of safe medication administration.

The present study finding revealed that the training sessions significantly improved midwives' post-medication administration practices such as administering medications without verifying patient identity, not checking drug expiration dates, neglecting documentation after administration, not adhering to the "five rights" of medication administration, and not following double-checking procedures for high-alert drugs, a critical but often underemphasized phase of the medication administration process. Prior to training, adherence to safe post-medication administration behaviors were relatively unsatisfactory, reflecting potential risks in patient monitoring, documentation, and communication.

One of the most important improvements in post medication administration was seen in reporting abnormal findings to physicians which considered as a vital for early detection of adverse drug reactions and clinical deterioration, and its enhancement demonstrates greater vigilance and responsibility among midwives following the training. After the intervention, however, marked improvements were observed across all measured domains, indicating that the training was effective in strengthening midwives' competency in this essential stage of care.

These results align with existing literature that highlights the effectiveness of continuous professional development programs in enhancing healthcare providers' competency and reducing the incidence of medication errors. This result comes in the line with study carried out in Egypt by Fathy et al. (2020) to assess nurse's knowledge and practice regarding medication errors showed that only more than one third of them had satisfactory practices in the preparation of medication, during medication administration, but the majority of them had satisfactory level of

practice after drug administration.

This finding was in agreement with study conducted in Egypt by Abu Hussein, Elsaied, and Ghandour (2022) to determine the effect of patient safety training program for nurses on medication administration at Damanhour Chest Hospital found high statistically significant difference of total nurses' knowledge, skills and attitude regarding (patient safety and medication administration) during all phases of the program with P- value = 0.000 at post program.

Another study conducted in Egypt by Abd Elmageed, Soliman, and Abdelhamed (2020) to assess Knowledge, Attitude and Practice of Nurses in Administering Medications at Mansoura University Hospitals revealed that greater than three quarters of the nurses have helpless practice score with respect to drug preparation, trailed by marginally greater than three fifths of them revealed poor practice level regarding medication administration as well.

Moreover, the study findings highlighted the broader implications for patient safety culture. Effective medication administration not only reduces clinical risks but also builds midwives' confidence and satisfaction in their professional roles. This is in line with international recommendations, such as those of the World Health Organization (WHO), which emphasize competency-based training as a critical strategy for improving maternal and neonatal health outcomes.

The results clearly demonstrated that the training program had a significant positive impact on midwives' overall practices related to medication administration, preparation, administration, and post-administration stages. During the preparation stage, the mean practice score increased post-training, administration stage and after medication administration with the improvement being statistically significant ($p < 0.001$). These results are consistent with previous studies showing that structured training interventions significantly enhance healthcare providers' adherence to safe medication practices, reduce error rates, and improve overall patient safety.

Additionally, the results showed a significant improvement in total practices post-training. The difference was statistically significant, as indicated by the paired t-test value of -6.229 ($p = .000$), suggesting that the observed improvement is due to the effectiveness of structured training programs in enhancing healthcare professionals' competencies and reducing errors. It indicated a strong and statistically significant positive association between knowledge and practice. The regression coefficient ($\beta = 4.389$) shows that for each one-unit increase in midwives' knowledge, their practice score increases by approximately 4.39 units, holding all else constant. This indicates that higher knowledge directly translates to improved adherence to correct medication administration practices.

This result goes in the same line with Egyptian study of Abdel Fattah et al. (2019) who reported in a published study conducted in Egypt aimed to assess the effect of maternity nurse's knowledge, and Practices regarding the medication errors on laboring women safety that there was a statistically significant difference between maternity nurses' knowledge regarding the drugs used in labor unit and precautions of medications administrating and nurses' level of practice. The results of Ragheb et al. (2016) revealed a statistically significant difference between the nurses' total knowledge and attended training in medication administration at $p = 0.03$.

Despite these positive findings, several limitations should be acknowledged. First, the study was conducted in a limited number of healthcare facilities, which may affect the generalizability of the results. Second, performance was assessed over a relatively short period following training; therefore, the long-term retention of skills and knowledge remains uncertain. Future research should consider longitudinal designs to evaluate sustained effects of training, as well as randomized controlled trials to establish stronger causal inferences.

The results of this study revealed a strong and statistically significant association between midwives' practices scores and three key factors: prior exposure to medication administration training, occurrence of medication errors, and adherence to error reporting ($p < 0.001$). These findings highlighted the central role of structured training and reporting culture in shaping safe medication practices among midwives. Midwives who had not received any prior medication administration training were more likely to demonstrate unsatisfactory practices compared to those who had undergone training at least once or more. The results showed that none of the midwives with repeated training sessions fell into the unsatisfactory category, while the majority of those without training did.

A significant relationship was also observed between medication error occurrence and practice scores. Midwives who reported making medication errors during their work were predominantly clustered in the unsatisfactory practices category, whereas those with no reported errors were more likely to have satisfactory practice scores. This suggests that unsafe practices directly contribute to error occurrence, reinforcing the need for targeted interventions to build competency and reduce preventable harm.

The present study findings were supported by the results of the study conducted in Egypt by Abdel Fattah et al. (2019) aimed to assess the effect of maternity nurse's knowledge, and Practices regarding the medication errors on laboring women safety that less than half of the studied sample had complete satisfactory level of practices and followed by about one third had an unsatisfactory level of practices. While the study conducted in Nigeria by Jafaru and Abubakar (2022) to examine the correlation between medication administration safety practices and perceived barriers among nurses showed high level of good medication administration practices among the respondents.

Conclusion

This research reveals high levels of psychological needs among women who have had an abortion because a large number of women demonstrated elevated psychological requirements. Providing specific mental health assistance combined with education remains essential to successful post-abortion patient support. A proposed post-abortion care plan focuses on developing specialized educational content and counseling services with support networks that healthcare providers and support networks can implement. Healthcare professionals should implement these resources in their regular abortion aftercare protocols to help patients manage psychological and emotional challenges which results in enhanced health outcomes.

Recommendation

Designing targeted and integrated programs that meet the needs of women who have had abortion, especially in the aspects of psychological support, health education, and psychological stress management.

formulate a proposed plan that combines educational, social, and psychological interventions to meet different needs, focusing on information support as the most important.

Limitations of the study

-This research contained a limited sample within one healthcare facility which impacts the ability to generalize the study's findings across broader population groups specifically in areas with different healthcare facilities as well as cultural backgrounds or social-economic characteristics.

-Using a purposeful sampling method created participant selection bias. The technique targets specific groups of women with associated experiences although it could fail to represent the complete range of experiences that exist in the general public.

Ethical consideration

Approval to conduct the study was obtained from the Research Ethical Committee of the Faculty of Nursing at Mansoura University, reference number (51/2024). The official endorsement was granted by the director of the aforementioned institution. The researcher engaged with the selected midwives who met the study's inclusion criteria, explaining the research's purpose to obtain their consent. All midwives who had experienced abortions were informed of their right to participate in the study and assured that they could withdraw at any time without providing a reason, with no effect on their healthcare. They were guaranteed anonymity and confidentiality throughout the research process, and it was emphasized that all collected data would be used solely for analysis.

Consent for publication

NA

Availability of data and materials

The corresponding author will provide the data supporting the study’s findings upon a reasonable request.

Author's contribution

All authors had a major input in drafting the editorial or revising it critically for important intellectual content. All the authors have equally contributed to conceptualizing, designing, analyzing, and Manuscript preparations. The Researcher B.E, H.S and F.M collected the collection.

Funding

This research paper was conducted without external funding or financial support.

Conflicts of interest

All the authors involved in this study declare no conflicting interests.

Acknowledgements

The authors would like to thank all the women who participated in this study

References

1. Hwang, J., & Chang, Y. (2023). Medication administration time and nursing workload. Journal of Nursing Management, 31(2), 145–153. https://doi.org/10.1111/jonm.13789
2. Lundborg, C. S., et al. (2024). Midwives’ role in maternal health care: A global perspective. International Journal of Midwifery, 42(1), 12–20.
3. Klein, R. (2024). Medication safety in pregnancy: Risks and responsibilities. Maternal and Child Health Journal, 28(3), 233–240.
4. Wesley, K., Sewell, J., Chang, L., Hatfield, R., & Nguyen, T. (2021). Medication use during pregnancy: Balancing risks and benefits. American Journal of Obstetrics & Gynecology, 225(5), 489–497.
5. Weld, E., Bailey, J., & Waitt, C. (2022). Safe prescribing in pregnancy: A review. British Journal of Clinical Pharmacology, 88(2), 321–330. https://doi.org/10.1111/bcp.15012
6. Brigitta, R., & Dhamanti, I. (2020). Medication administration errors among nurses: A systematic review. Journal of Nursing Care Quality, 35(4), 298–305.
7. Vaismoradi, M., Tella, S., Logan, P. A., Khakurel, J., & Vizcaya-Moreno, F. (2020). Nurses’ adherence to clinical guidelines in medication administration: A systematic review. Pharmacy, 8(4), 201.

8. Hanson, A., & Haddad, L. M. (2022). Nursing rights of medication administration. In StatPearls. StatPearls Publishing.
9. Türken, M., & Çalım, S. (2022). Legal and ethical responsibilities in midwifery practice. Journal of Nursing Ethics, 29(6), 987–995.
10. Dagne, T., & Beshah, D. (2021). Continuous professional development in midwifery: Medication administration focus. BMC Nursing, 20(1), 112.
11. International Confederation of Midwives. (2019). Essential competencies for midwifery practice. ICM.
12. Watson, J. (2021). Continuing education in medication administration for midwives. Midwifery Today, 137, 22–27.
13. Groos, J., Walter, A., Wittek, A., Strizek, B., Gembruch, U., & Recker, F. (2024). Shaping ultrasound in midwifery: Towards an evidence-based training framework for enhanced prenatal care. Archives of Gynecology and Obstetrics.
14. Miller, C. J., Smith, S. N., & Pugatch, M. (2020). Experimental and quasi-experimental designs in implementation research. Psychiatry Research, 283, 112452.
15. Shebl, N., Assiri, G., Mahmoud, M., Aloudah, N., Grant, E., Aljadhey, H., & Sheikh, A. (2020). Epidemiology of medication administration errors in healthcare: A systematic review. BMJ Open, 8(5), e019101.
16. Fathy, A., Khalil, M., Taha, S., & Abd-elbaky, M. (2020). Midwives' medication administration observational checklist. Egyptian Journal of Nursing, 16(2), 45–56.
17. Abdelrahman, E., Zidan, S., & Rushdan, E. (2020). Effectiveness of flipped classroom approach on safe medication administration learning skill among nursing students. Egyptian Journal of Health Care, 10(4), 162–175.
18. Thelen, E. A. (2022). Engaging nursing students in quality improvement: Teaching safe medication administration. Journal of Nursing Education, 61(5), 268–271.