The Effects of Midwifery Students' Simulation Training in Perineal Repair: A Quasi-Experimental Study

Zahra Sadat Pajohideh[1], Solmaz Mohammadi [2], Fatemeh Keshmiri [3] , Azam Honarmandpour [1*], Azam Jahangirimehr [4]

[1] MSc of Midwifery, Department of Midwifery, Shoushtar Faculty of Medical Sciences, Shoushtar, Iran.
[2] Reproductive Health Promotion Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
[3] Medical Education Department, Educational Developmental Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[4] MSc of Biostatistics, Shoushtar Faculty of Medical Sciences, Shoushtar, Iran.

Abstract

Background: The decrease in normal deliveries and episiotomies in midwifery practice has reduced the experience of midwifery students in perineum repair. This study examined the effect of perineal repair simulation training on the clinical skills of midwifery students by designing, implementing and evaluating simulation models in procedural education.

Methods and materials: This quasi-experimental study was conducted on 60 midwifery students in intervention and control groups at Shoushtar, Iran, from September 2018 to August 2021. The intervention group received simulation training before entering the formal clinical education courses, while the control group took part in workplace-based training. The clinical repair skills of these students for performing normal vaginal birth in the real field were evaluated by observational examination in the two years (fifth, and sixth semesters). Students' skills were assessed in the real clinical environment using an observational examination. Data were analyzed using an independent t-test, a chi-square test, and analysis of variance (ANOVA) in SPSS software. All p-values <0.05 were considered statistically significant.

Results: The mean score of perineal repair skill in the control group was 41.52 ± 3.33 and in the simulation training group was 49.73 ± 6.83. The difference in the skill score between the groups was statistically significant (8.21±1.16) ($p<0.001$). The results showed that, in the intervention group, 25 (83.33%) students were at a good to excellent level, while in the control group 21 (70.00%) students were at an average skill level, and the rest were at a low level ($p< 0.001$). **Conclusions:** The results of the present study indicated that the simulation for critical skills such as perineal repair skills was significantly more effective than workplace-based learning situations.

Keywords: Simulation Training, Perineum, Midwifery, Clinical Competence

Introduction

Perineal injuries, which involve a tear between the vaginal opening and the anal sphincter region, are a common occurrence during childbirth, affecting approximately 90% of women to varying degrees during natural childbirth(1) These injuries usually occur during prolonged labor, when the baby's head or shoulders pass through the vaginal opening, causing a midline or mid-lateral tear(2) Based on the extent of the tear and its extension into adjacent tissues, perineal tears are classified into first and second-degree (low-grade wounds), and third and fourth-degree (higher-grade wounds) wounds(3). Although low-grade tears are considered low-risk tears, with a higher frequency after delivery, if repaired incorrectly, they can cause complications such as infection, chronic pain, and sexual dysfunction for the patient (4). Third-degree and fourth-degree tears, also known as obstetric anal sphincter injuries (OASIS), are more complex in nature and can potentially cause fecal incontinence if repaired improperly, thus requiring more advanced suturing techniques and operator skill (5)(

Skilled birth attendants (SBAs) must be proficient in identifying, classifying, and repairing perineal tears (6). The WHO defines an SBA as a trained and accredited health professional (midwife, doctor, or nurse) competent in managing uncomplicated pregnancies, childbirth, and the immediate postnatal period, as well as identifying, managing, and referring complications in women and newborns (7). SBAs commonly use visual and digital examinations to assess and classify tears after childbirth. However, inconsistent education and training of SBAs is a growing concern, potentially leading to inadequate skills in performing these examinations accurately (6). Worldwide, SBAs demonstrate inadequate knowledge of perineal anatomy and insufficient training in the assessment and classification of perineal tears (8). Therefore, continuous training of SBAs at all levels of practice is necessary to increase awareness and guarantee accurate diagnosis and appropriate management of these injuries (9). Perineal tearing during childbirth cannot be prevented entirely due to non-modifiable risk factors (10). If the repair is not performed correctly, women may suffer from psychological and physiological problems in the postpartum period, and their quality of life (QOL) will decrease. Currently, there is no national or global standardized package or programme aimed at improving the knowledge and skills of SBAs in assessment and classification of perineal tears. Therefore, it is very important to acquire the ability to perform restoration through the most effective training methods (11, 12). The results of a review study show that structured educational and training programs in perineal wound assessment and repair for midwives and midwifery students significantly increase participants' confidence, knowledge, and skills in managing perineal trauma, which can ultimately help reduce the increasing rate of severe perineal trauma and improve maternal outcomes (13). The use of a multifaceted educational approach, including the teaching method, simulation, and maximizing the learning opportunity, is recommended to improve the performance of procedures, such as perineal tear repair, with high accuracy and low incidence in specialized fields such as obstetrics and gynecology (11). The skills and experiences gained in the simulation environment transfer theoretical knowledge to pre-clinical practice (14); interns gain experience through

imitation and repetition of a real event, activity, or practice with artificial or virtual tools, and as a result avoid the risk of actual injury (15).

It was found that simulation-based learning is useful for developing midwifery skills and has a positive impact on clinical practices in a systematic study by Cooper et al., (16). Currently, instead of the trial-and-error method, surgical training is done through simulators, using artificial sponges and raw cow tongue meat (17). As a synthetic material, the sponge is easy, cheap, and simple to make, while the preparation of cow tongue meat as a dead animal tissue is time-consuming and expensive (18). Since there is little research on the technical skill assessment of perineal repair as part of a program, Therefore, this study was performed to evaluate the effectiveness of perineal repair simulation on the technical skill of midwifery students(19)

Methods and materials

Trial design:

This quasi-experimental study, with a parallel design, Similar to the implementation methodology of our prior study (16) was conducted from September 2018 to August 2021 in Shoushtar Faculty of Medical Sciences, southwest of Iran.

Study population:

The participants consisted of all third-year midwifery students (semester 5) of Shoushtar Faculty of Medical Sciences in the academic years of 2018, 2019, and 2020 (60 midwifery students) who were selected through census method. The students were divided into 2 groups of intervention and control. The study inclusion criteria included the willingness to participate in the study. Students who had recognizable diseases affecting learning ability, occurrences of stress, and accidents during the training and evaluation sessions, learning and working experiences related to perineum repair, or passing previous education on childbirth were excluded from the research.

Allocation of participants:

The participants were assigned to the intervention group and the control group in a ratio of 1:1, 30 students in each group

Instructor and Evaluators: An experienced instructor (master's degree in midwifery) trained both intervention and control groups. Both groups were evaluated by two instructors with more than 10 years of experience. Trainers and evaluators in this study were on average 38 years of age.

Educational Intervention: Intervention group (simulated) participants received training related to the study's purpose from a midwife trainer prior to entering the clinical setting. The main goals of the training were to help perform first-degree and second-degree perineal repair, including identifying perineal injuries, the degree of severity, and suture repair patterns. Students in the intervention group also participated in a three-day workshop to practice perineal repair on a silicone model. The equipment provided to the students included toothed forceps, suture scissors, surgical absorbent pads, medical grade catgut suture needle, and a silicone model of the perineum. The students were asked to exercise the taught skills on simulation models.

After completing the initial training, the trainer asked each of the students to practise the repairing of the perineum on the existing silicone mollage, and each would perform at

least 3 repairs on the mollage under the supervision of the instructor during 30 minutes. Some students needed more time to perform the repair (50 minutes). After completing the simulated training course, the students went to the maternity unit of Al-Hadi Hospital to complete the natural childbirth unit, where the same instructor gave the usual training at a pregnant mother's bed.

Control Group: The participants in the control group experienced lectures and practical work in the workplace-based learning situations. Clinical training was provided to the students in accordance with the clinical lesson plan for the academic semester. The content of clinical training generally followed that of simulation group training. In the clinical environment, students obtained clinical histories, checked vital signs, performed Leopold's maneuvers, checked the fetal heart rate, performed vaginal exams, inserted an intravenous (IV) line, sent laboratory tests, checked labor progress, plotted a partograph, and delivered a fetus under the instructor's supervision. Each clinical field student is required to perform at least 3 perineal repairs under the guidance of an instructor. It should be noted that the training in the intervention and control groups was conducted by the same instructor and the conditions for evaluating the practical skills of childbirth were the same for all students in the two groups.

Assessment Tools:

The tool used for measuring students' clinical skills was a 14-question checklist scored based on a six-point scale (unacceptable, very poor, poor, average, good, and excellent). The total score of this checklist ranged between 14 and 84 points, and higher scores indicated higher levels of students' skills in childbirth.

The initial checklist was designed based on the topics of the students' educational program. The initial checklist was provided to 10 faculty members to determine its content validity. This checklist was finalized after going through 2 stages through applying the experts' opinions. The finalized checklist was pilot tested among 10 students in a selected teaching hospital to identify possible problems in the checklist.

The clinical skill of performing perineal repair was evaluated by two academic instructors, who had experience and who were not involved (?) in the training process, separately and simultaneously. A two-hour session was held to explain the checklist and how to score the checklist to the evaluator coach with over 10 years of experience. Additionally, instructors were asked to fully explain the evaluation method to the students

Evaluating instructors were blinded to group allocation. To investigate the long-term effects of the perineal repair training, students were evaluated in the 5th, and 6^{th} semesters.

Data Analysis: The Shapiro-Wilks test was used to check the normality of data distribution. As the data distribution was normal, independent t-test was used to compare the study groups, and analysis of variance (ANOVA) was utilized to compare the 2 academic semesters. Moreover, based on the general linear model (GLM), repeated measures were used to define factors. We examined time, group, and time-group interaction effect on students' skills. Data were analyzed using SPSS software (version 23; IBM Corp., Armonk, NY, USA). The

significance level of the above tests was considered smaller than 0.05.

Ethical consideration

The current study was approved by the ethics committee at the Shoushtar Faculty of Medical Sciences (IR.SHOUSHTAR.REC.1397.006) in the southwest of Iran). The study's objectives were explained to all students, and it was emphasized that participation was completely voluntary and did not interfere with the subsequent educational program or with final grades. All students completed the written informed consent to participate in the study.

Results

In this study, 60 students participated, 30 (50.0%) were in the intervention group and 30 (50.0%) were in the control group. The average age of the students was 21.40 ± 0.83 years, with a range of 19-25 years.

There was a significant difference students' perineal repair skill between the intervention and control groups in the 5th and 6th semesters ($p < 0.001$) (Tables 1 and 2).

Table 1. Comparison of students' perineal repair skill checklist scores in the 5th semester

Skill questions	Control (n = 30)	Intervention (n = 30)	Mean difference	t-test	p-value
Prep has been done correctly.	3.55 ± 0.51	3.95 ± 0.46	0.40 ± 0.14	2.77	0.008**
Drape has been done correctly.	3.50 ± 0.51	3.95 ± 0.46	0.45 ± 0.14	3.10	0.003**
Anesthesia performed correctly	2.80 ± 0.52	3.25 ± 0.67	0.45 ± 0.18	2.43	0.019*
Repair of the connector vagina has been done correctly.	2.30 ± 0.47	2.79 ± 0.58	0.49 ± 0.16	3.01	0.004**
The rim has been repaired correctly.	2.40 ± 0.50	2.66 ± 0.56	0.26 ± 0.16	1.63	0.109
The restoration of the couchette has been done correctly.	2.75 ± 0.44	3.16 ± 0.38	0.68 ± 0.19	3.35	0.001**
The muscle has been repaired correctly.	2.75 ± 0.44	3.16 ± 0.38	0.41 ± 0.12	2.11	0.002**
The repair under the skin has been done correctly.	2.90 ± 0.30	3.20 ± 0.58	0.41 ± 0.12	.957	0.002**
The skin has been repaired correctly.	3.25 ± 0.63	3.45 ± 0.77	0.30 ± 0.14	3.30	0.041*
Identification of the degree of severity and patterns of suture repair	2.65 ± 0.48	3.08 ± 0.58	0.20 ± 0.21	2.63	0.344
The work steps have been done in the correct order	2.95 ± .22	3.20 ± 0.41	0.25 ± 0.10	2.02	0.017*
The speed of action	2.65 ± .48	3.08 ± 0.40	0.55 ± 0.16	2.95	0.002**

Level of anxiety	2.80 ± .41	3.12 ± 0.61	0.43 ± 0.16	2.49	0.049*
Level of self-efficacy	2.75 ± .44	3.16 ± 0.48	0.41 ± 0.14	3.35	0.005**
Average total skill scores	2.85 ± .36	3.18 ± 0.40	0.33 ± 0.11	3.90	0.045*
Total scores	**40.05 ± 3.47**	**45.45 ± 5.71**	**5.40 ± 1.46**	**3.70**	**0.001****

*Significant at $p < 0.05$ level. **Significant at $p < 0.01$ level.

Table 2. Comparison of students' perineal repair skill checklist scores in the 6th semester

Skill questions	Control (n = 30)	Intervention (n = 30)	Mean difference	t-test	p-value*
Prep has been done correctly.	3.81 ± 0.50	4.36 ± 0.49	0.54 ± 0.14	3.64	0.001**
The drape has been done correctly.	3.90 ± 0.52	4.36 ± 0.49	0.45 ± 0.15	2.95	0.005**
Anesthesia performed correctly	2.90 ± 0.61	3.68 ± 0.56	0.77 ± 0.17	4.34	< 0.001**
Repair of the connector vagina has been done correctly.	2.40 ± 0.50	3.31 ± 0.64	0.90 ± 0.17	5.20	< 0.001**
The rim has been repaired correctly.	2.31 ± 0.47	3.36 ± 0.58	1.04 ± 0.16	6.52	< 0.001**
The restoration of the fourchette has been done correctly.	3.00 ± 0.00	3.86 ± 0.56	0.86 ± 0.12	7.23	< 0.001**
The muscle has been repaired correctly.	3.00 ± 0.43	3.86 ± 0.35	0.86 ± 0.12	6.92	< 0.001**
The repair under the skin has been done correctly.	3.09 ± 0.29	4.09 ± 0.61	1.00 ± 0.14	3.57	< 0.001**
The skin has been repaired correctly.	3.59 ± 0.50	4.18 ± 0.58	0.59 ± 0.16	7.09	0.001**
Identification of the degree of severity and patterns of suture repair	2.86 ± 0.46	3.86 ± 0.46	1.00 ± 0.14	6.04	< 0.001**
The work steps have been done in the correct order.	3.09 ± 0.29	3.90 ± 0.29	0.81 ± 0.08	7.23	< 0.001**
The speed of action	2.86 ± 0.56	3.77 ± 0.42	0.90 ± 0.15	8.10	< 0.001**
Level of anxiety	3.00 ± 0.43	3.86 ± 0.35	0.86 ± 0.12	9.22	< 0.001**
Level of self-efficacy	3.00 ± 0.43	3.90 ± 0.29	0.90 ± 0.11	7.23	< 0.001**
Average total skill scores	3.00 ± 0.00	3.59 ± 0.50	0.59 ± 0.11	7.08	< 0.001**
Total scores	**42.86 ± 2.62**	**54.40 ± 4.55**	**11.54 ± 1.20**	**10.30**	**< 0.001****

*Significant at $p < 0.05$ level. **Significant at $p < 0.01$ level.

Average overall score of perineal repairs in both semesters was significantly higher in the intervention group 8.21 ± 1.16 compare to the control group (49.73 ± 6.83vrs. 41.52 ± 3.33), ($p < 0.001$) (Table 3, Figure 1).

Table 4, shows that in the intervention group 25 (83.33%) students had a good to excellent perineal repair skill level and 5 (16.67%) students had an average perineal repair skill level, and in the control group 21 (70%) students had an average perineal repair skill level and the others were at lower levels.

In order to compare the skills scores of the intervention and control groups, it is necessary to look at their results during different academic semesters. We used the GLM test for this purpose repeated measures. In general, students' perineal repair skill scores have changed over time (time-variable) ($p < 0.001$; $\eta 2 = 0.386$), and compared to the control group ($p < 0.001$; $\eta 2 = 0.631$). We also studied the effect of group and time, and our results showed significant difference between two groups (CI: 95%, $p < 0.001$; $\eta^2 = 0.270$) (Table 5)

Table 3. Comparison of students' perineal repair skill scores in the two groups of Intervention and Control.

Skill questions	Control (n = 30)	Intervention (n = 30)	Mean difference	t-test	p-value*
Prep has been done correctly.	3.69 ± 0.51	4.15 ± 0.51	0.46 ± 0.11	3.09	0.001**
The drape has been done correctly.	3.71 ± 0.55	4.15 ± 0.51	0.43 ± 0.11	2.87	0.006**
Anesthesia performed correctly	2.85 ± 0.56	3.45 ± 0.65	0.59 ± 0.13	7.01	< 0.001**
Repair of the connector vagina has been done correctly.	2.35 ± 0.48	3.04 ± 0.66	0.68 ± 0.12	4.18	< 0.001**
The rim has been repaired correctly.	2.35 ± 0.48	3.00 ± 0.66	0.64 ± 0.12	3.89	< 0.001**
The restoration of the fourchette has been done correctly.	2.88 ± 0.32	3.50 ± 0.58	0.61 ± 0.10	3.50	< 0.001**
The muscle has been repaired correctly.	3.00 ± 0.31	3.63 ± 0.74	0.63 ± 0.12	2.44	0.013
The repair under the skin has been done correctly.	3.42 ± 0.59	3.80 ± 0.77	0.37 ± 0.14	3.17	< 0.001**
The skin has been repaired correctly.	2.78 ± 0.47	3.54 ± 0.62	0.75 ± 0.11	6.26	< 0.001**
Identification of the degree of severity and patterns of suture repair	2.76 ± 0.53	3.41 ± 0.61	0.65 ± 0.12	5.58	< 0.001**
The work steps have been done in the correct order	2.90 ± 0.45	3.47 ± 0.62	0.57 ± 0.11	5.08	< 0.001**
The speed of action	2.88 ± 0.45	3.50 ± 0.50	0.64 ± 0.10	5.28	< 0.001**

Level of anxiety	3.02 ± 0.26	3.54 ± 0.50	0.51 ± 0.08	4.89	< 0.001**
Level of self-efficacy	2.88 ± 0.45	3.50 ± 0.50	0.61 ± 0.10	5.53	< 0.001**
Average total skill scores	2.92 ± 0.26	3.32 ± 0.51	0.08 ± 0.57	2.89	< 0.001**
Total scores	**41.52 ± 3.33**	**49.73 ± 6.83**	**8.21 ± 1.16**	**7.09**	**< 0.001****

*Significant at p < 0.05 level.
**Significant at p < 0.01 level.

Table 4. The frequency of scores obtained by students in the control and intervention groups on the skill questionnaire by semester

Semester	Control (n = 30)					Intervention (n = 30)				
	Very weak	Weak	Medium	Good	Excellent	Very weak	Weak	Medium	Good	Excellent
5	0(0.0)	3(15.00)	17(56.66)	10(33.33)	0(0.0)	0(0.0)	0(0.0)	7(23.33)	17(56.66)	6(20.00)
6	0(0.0)	4(13.33)	8(26.66)	18(60.00)	0(0.0)	0(0.0)	0(0.0)	6(20.00)	19(63.33)	5(16.66)
Total	**0(0.0)**	**3(10.00)**	**6(20.00)**	**21(70.00)**	**0(0.0)**	**0(0.0)**	**0(0.0)**	**5(16.66)**	**22(73.33)**	**3(10.00)**

Table 5. Examining the effect of investigated groups, different times, and the effect of group*time on students' perineal repair skills with using GLM test

Variable	Effects	Sum of square	df	F	Beta	lower	upper	p-value	Partial Eta squared
Skill	Group	1149.13	1	71.71	-2.90	-5.67	-0.14	< 0.001**	0.631
	Time	698.90	1	26.40	9.55	7.19	12.71	< 0.001**	0.386
	Group * time	410.22	1	15.49	-8.63	-12.54	-4.72	< 0.001**	0.270

*Significant at p < 0.05 level. **Significant at p < 0.01 level.

Discussion

This study was conducted to evaluate the effectiveness of perineal tear repair simulation on the technical skills of midwifery students. Our results demonstrated, simulation-based training

improved the efficiency of students in perineal repair, and this effect was stable in the long term. These results were similar to the study by Demirel et al., which showed that episiotomy repair simulation training with a cow tongue model increases the level of students' self-efficacy (20). Simulation training with both cow tongue and sponge models is associated with a great increase in students' self-confidence in clinical settings as found by Guler et al.'s research (21). Simulation training of female anal sphincter repair with both models of cow's tongue and spongy perineum is associated with the improvement of knowledge, and self-confidence level that showed in a literature (17). In addition, the simulated practice of postpartum perineal tear repair is an educational strategy with high potential in the training of nurses, and enables student-centered learning in a controlled and safe environment that showed by Sotto-Mayor et al. (22).

The ability to practice on an animal model by imitating natural tissues is not only the best, however the only effective way to learn the surgical technique. From their point of view, training to simulate 3rd and 4th-degree tears using pig perineum provides a good opportunity to identify and diagnose the tissues and organs that are exposed to damage during complicated childbirth that indicated in one literature (23). Furthermore, using a simulation model to teach pediatric colorectal surgery (perineal fistula) is a cost-effective and effective method in preclinical workshops that reported by Joosten et al. (24). Simulation can lead to learning a higher level of cognitive and psychomotor performance from learners compared to clinical training as learners must physically manipulate objects, draw observations, and combine information (25). Patients treated by an individual are more at risk of complications, and students understand this risk and know that possible harm may occur if they do not acquire the necessary knowledge and skills (26). Simulation allows learners to make mistakes and learn from them at no cost to patient safety (27).

As demonstrated in our study, simulation creates a stress-free environment for students to practice and learn at their own pace by removing the time pressure associated with a busy clinical environment. Participation in learning is very important and necessary for professional education. Clinical care simulation can improve skills by creating clinical situations that engage students' interest, attention, and learning. The simulation must be physically, emotionally, and cognitively engaging for the learner to maximize their skill (28). In order to maximize learning, the simulation should be implemented in a realistic manner (relevant to the real environment). Simulation improves critical thinking and transforms theoretical knowledge into practice. To maximize cost-effectiveness in low-income communities, highly realistic simulators do not require sophisticated technology (29). Regarding the importance of technical skill in the clinical setting, we believe that the results of this study can help educators develop new simulation-based teaching methods to address this important issue. Simulation's role in teaching technical skills depends heavily on its acceptance in midwifery schools and on the reliability of learning outcomes assessments (30).

Study Limitations

The present study had some limitations. Participants in this research had no previous experience with reconstruction or gynecological simulators and no randomization ensured a similar distribution between groups. However, other unmeasured differences in terms of characteristics perineal of participants could have influenced the results. Simulation-based learning has limitations that a large group of individuals cannot have individual training in the practice environment. In this study, the skills learned in the simulated environment were evaluated on real patients in the clinical setting by two instructors with over ten years of experience at the same time in two consecutive semesters. Also since the midwifery students were in the same year there could have been contamination through students in the intervention group discussing their learnings with fellow student in the control group?

Conclusions

This study provides strong evidence that simulation-based training significantly enhances the clinical skills of midwifery students in performing perineal repairs. The findings demonstrate that students who received simulation training achieved higher skill scores and were more likely to attain good to excellent competency levels compared to those undergoing traditional workplace-based training. These results underscore the value of integrating simulation models into midwifery education to better prepare students for real-world clinical practice, especially in situations where opportunities for hands-on experience are limited. Implementing simulation training can ultimately improve patient care quality and safety by ensuring that future midwives are proficient in critical procedures such as perineal repair. Therefore, curriculum developers and educators should consider the incorporation of simulation-based methods to enhance the overall competency and confidence of midwifery students in performing essential clinical skills.

Acknowledgments

We thank all the participants who volunteered for this study; this study is derived from a research project Shoushtar faculty of Medical Sciences. All expenses of this study were provided by the Shoushtar Faculty of Medical Sciences and National Agency for Strategic Research in Medical Education.

Conflict of Interest and Funding Sources: None

References

1. Richmond D. Perineal tearing is a national issue we must address. Royal College of Obstetricians and Gynaecologists. 2014.

2. Konnyu K. What is known about 3rd and 4th degree lacerations occurring during vaginal birth? 2011.

3. Villot A, Deffieux X, Demoulin G, Rivain A, Trichot C, Thubert T. Management of third and fourth degree perineal tears: A systematic review. Journal de gynécologie, obstétrique et biologie de la reproduction. 2015;44(9):802-11.

4. Elharmeel SM, Chaudhary Y, Tan S, Scheermeyer E, Hanafy A, Van Driel ML. Surgical repair of spontaneous perineal tears that occur during childbirth versus no intervention. Cochrane Database of Systematic Reviews. 2011(8).

5. Harvey M-A, Pierce M, Walter J-E, Chou Q, Diamond P, Epp A, et al. RETIRED: Obstetrical Anal Sphincter Injuries (OASIS): Prevention, Recognition, and Repair. Journal of Obstetrics and Gynaecology Canada. 2015;37(12):1131-48.

6. Simpson G, Philip M, Richards A, Eggleston AJ, Vogel JP, Wilson AN, et al. Effectiveness of education and training programmes to help clinicians assess and classify perineal tears: a systematic review. BMJ open. 2025;15(6):e095961.

7. Berhan Y, Berhan A. Skilled health personnel attended delivery as a proxy indicator for maternal and perinatal mortality: a systematic review. Ethiopian journal of health sciences. 2014;24:69-80.

8. Zimmo K, Laine K, Vikanes Å, Fosse E, Zimmo M, Ali H, et al. Diagnosis and repair of perineal injuries: knowledge before and after expert training—a multicentre observational study among Palestinian physicians and midwives. BMJ open. 2017;7(4):e014183.

9. Hickman LC, Propst K. Accurate diagnosis and repair of obstetric anal sphincter injuries: why and how. American Journal of Obstetrics and Gynecology. 2020;222(6):580. e1-. e5.

10. Jha S, Parker V. Risk factors for recurrent obstetric anal sphincter injury (rOASI): a systematic review and meta-analysis. International urogynecology journal. 2016;27:849-57.

11. Bick DE, Kettle C, Macdonald S, Thomas PW, Hills RK, Ismail KM. PErineal Assessment and Repair Longitudinal Study (PEARLS): protocol for a matched pair cluster trial. BMC pregnancy and childbirth. 2010;10:1-8.

12. Wilson AN, Homer CS. Third-and fourth-degree tears: A review of the current evidence for prevention and management. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2020;60(2):175-82.

13. Diaz MP, Simpson N, Brown A, Diorgu FC, Steen M. Effectiveness of structured education and training in perineal wound assessment and repair for midwives and midwifery students: A review of the literature. European Journal of Midwifery. 2021;5:13.

14. Yılmaz T, Karanisoğlu H. Türkiye'de ebelik eğitiminin güncel durumu. Sağlık Bilimleri ve Meslekleri Dergisi. 2016;3(1):73-7.

15. Edeer AD, Sarikaya A. The use of simulation in nursing education and simulation types/Hemsirelik egitiminde simulasyon kullanimi ve simulasyon tipleri. Journal of Education and Research in Nursing. 2015;12(2):121-6.

16. Cooper S, Cant R, Porter J, Bogossian F, McKenna L, Brady S, et al. Simulation based learning in midwifery education: a systematic review. Women and Birth. 2012;25(2):64-78.

17. Dancz CE, Sun V, Moon HB, Chen JH, Özel B. Comparison of 2 simulation models for teaching obstetric anal sphincter repair. Simulation in Healthcare. 2014;9(5):325-30.

18. Tsakiridis I, Mamopoulos A, Athanasiadis A, Dagklis T. Obstetric anal sphincter injuries at vaginal delivery: a review of recently published national guidelines. Obstetrical & gynecological survey. 2018;73(12):695-702.

19. Brereton S, Curtin M, Greene E, Hardie P, Szafranska M, Kirwan C. A blended learning perineal suturing programme for midwifery students: An evaluative descriptive study. Nurse Education in Practice. 2022;64:103453.

20. Demirel G, Evcili F, Kaya N, Doganer A. The Effect of Episiotomy Repair Simulation on the Anxiety and Self-Efficacy levels of Midwifery Students. Journal of Midwifery & Reproductive Health. 2020;8(1).

21. Guler H, Cetin P, Yurtsal ZB, Cesur B, Bekar M, Uçar T, et al. Effect of episiotomy training with beef tongue and sponge simulators on the self-confidence building of midwifery students. Nurse education in practice. 2018;30:1-6.

22. Sotto-Mayor L, Santos MAFd, Soares IMT, Félix MTS, Delgado MJ, Serra IMGGdR. Surgical reconstitution of the perineum after delivery: a qualitative study of a pedagogical practice. Ciência & Saúde Coletiva. 2021;26:475-83.

23. Ciesielski P, Kołodziejczak M, Dutkiewicz P. New porcine model of perineal tear and its utility in physicians' training on the reconstruction of 3rd and 4th degree perineal tear during vaginal delivery. Ginekologia polska. 2018;89(10):558-62.

24. Joosten M, Bökkerink GM, Levitt MA, Diefenbach KA, Reck CA, Krois W, et al. The use of an inanimate simulation model for the correction of an anorectal malformation in the training of colorectal pediatric surgery. European Journal of Pediatric Surgery. 2022;32(03):287-93.

25. LaDage LD, Tornello SL, Vallejera JM, Baker EE, Yan Y, Chowdhury A. Variation in behavioral engagement during an active learning activity leads to differential knowledge gains in college students. Advances in physiology education. 2018;42(1):99-103.

26. Hall SW. High-fidelity simulation for senior maternity nursing students. Nursing Education Perspectives. 2015;36(2):124-7.

27. Kumar A, Wallace EM, East C, McClelland G, Hall H, Leech M, et al. Interprofessional simulation-based education for medical and midwifery students: a qualitative study. Clinical simulation in nursing. 2017;13(5):217-27.

28. Choi W, Dyens O, Chan T, Schijven M, Lajoie S, Mancini ME, et al. Engagement and learning in simulation: recommendations of the Simnovate Engaged Learning Domain Group. BMJ Simulation & Technology Enhanced Learning. 2017;3:S23.

29. Kirkman TR. High fidelity simulation effectiveness in nursing students' transfer of learning. International journal of nursing education scholarship. 2013;10(1):171-6.

30. Bogossian F, McKenna L, Higgins M, Benefer C, Brady S, Fox-Young S, et al. Simulation based learning in Australian midwifery curricula: Results of a national electronic survey. Women and Birth. 2012;25(2):86-97.

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial 2.0 Generic License.