

Effectiveness of Exercises Incorporating Simulation Learning in Midwifery Students: Using Situation-Based Training

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ABSTRACT

Objective: The effects of simulation learning, which was implemented to build a foundation for the development of midwives who are required to be diverse and improve their thinking and judgment skills, based on the social background in Japan.

Materials and Methods: Aiming to cultivate a continuous perspective from pregnancy to delivery and postpartum, simulation learning was conducted from May to June 2022 for nine consenting midwifery students in the first year of a university major program in three situations: (1) pregnancy, (2) Labor and delivery, and (3) postpartum and neonatal period.

Results and Conclusion: Simulation learning was found to be effective in all situations. However, there is no significant effect on the content knowledge surrounding (1) Pregnancy that can be learned academically, and it is important to consider how to utilize the knowledge acquired academically in a scene. Furthermore, no significant effect was observed for the items in Attitude, no significant effect was observed, suggesting that there is a limit to improvement in learning effects. This is because simulation learning is different from clinical settings where people are directly cared for, so it is thought that learning effects cannot be obtained.

KEY WORDS

midwifery education, thinking and judgment, simulation learning

INTRODUCTION

Japan is experiencing a declining birthrate, aging population, and weakening regional and family functions. In addition, with women entering the workforce and marrying and giving birth later in life, a need arises for more advanced perinatal care¹⁾. As a result, with the medical model in Japan becoming more advanced, midwives are required to be more diverse in their activities²⁾. To become a midwife in Japan, one is required by the Act on Public Health Nurses, Midwives, and Nurses to complete at least one year of required coursework after qualifying to take the National Nursing Examination³⁾. There are many time constraints in some educational programs, and it is difficult to acquire consistent midwifery practice skills in a midwifery educational system with a variety of educational programs⁴⁾. With so many time constraints, lectures focus on knowledge from textbooks. Furthermore, clinical practice is often not about learning an integrated thought process to determine the subject's continuous process from gestation to labor and delivery and the postpartum period, and develop midwifery care; instead, the practical training is often completed with the goal of completing the 10

cases⁵⁾ of delivery assistance specified in the regulations for midwifery training⁶⁾. However, the Ministry of Health, Labor, and Welfare has proposed "Practical Skills, Goals, and Level of Attainment Required of Midwives at Graduation (2019 rev.)"⁶⁾, and effective educational content should be considered in all educational programs. The Japan Society Midwifery Education reports that current undergraduate midwifery education makes it difficult to reach the "goals and level of attainment at graduation" and that there are differences in assessment skills, skill levels, and other levels of attainment at graduation by institution and educational program^{7,8)}. Furthermore, to continue providing high quality midwifery education, it is necessary to ensure a learning environment that can improve the practical skills of midwifery students, especially during the progress of delivery, when they must be able to think and judge the situation instantly and protect the safety of the mother and child. In recent years, the effectiveness of comprehensive simulation education has already been reported in the current situation where students are forced to practice on campus due to their inability to attend on-site training during the coronavirus pandemic⁹⁾. However, no reports of midwifery education exist that evaluate subject-centered thinking and judgment during pregnancy, labor and delivery, the postpartum period,

Received on September 3, 2022 and accepted on September 23, 2022

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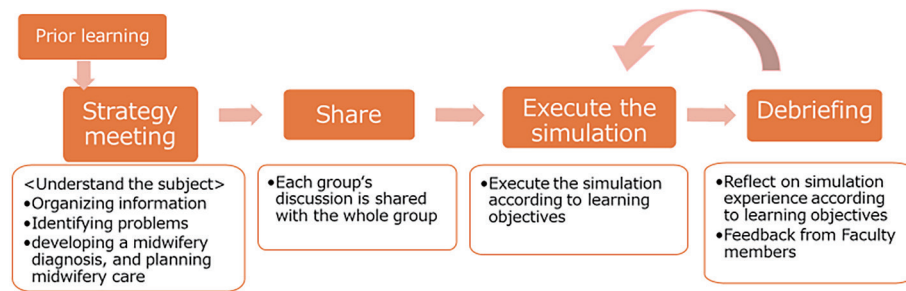


Figure 1: The actual flow of simulation learning (Situation-Based Training)

and the neonatal period. Therefore, this study reports the effects of simulation learning (Situation-based Training), which was implemented to build a foundation for the development of midwives who are required to be diverse and improve their thinking and judgment skills, based on the social background in Japan.

METHODS

Subjects

Aiming to cultivate a continuous perspective from pregnancy to delivery and postpartum, simulation learning (situation-based training) was conducted from May to June 2022 for nine consenting midwifery students in the first year of a university major program in three situations: (1) pregnancy (health education during a pregnancy health examination), (2) delivery (care during delivery progress), and (3) postpartum and neonatal period (physical assessment of mother and infant and family planning support).

Simulation learning (Figure 1)

The subjects of this study, midwifery students in the first-year major program at the university, were set up in a study environment that allowed them to visualize perinatal scenes from the time of their enrollment to the time before their clinical practice (April to June). In addition, knowledge and information were shared among students to facilitate smooth communication and improve communication skills. Faculty members served as facilitators to help the participants develop midwifery diagnoses and care plans with clear medical rationales to promote professional independence in line with the needs of the subject and with an ongoing perspective from the gestational period to the postpartum period.

The actual flow of simulation learning (Situation-Based Training) is shown in Figure 1. First, a group discussion (strategy meeting) is held so that each group (4 students/G x 2G) can smoothly execute the simulation according to the scenes (scenarios) presented to them. This involves organizing information to understand the subject, identifying problems, developing a midwifery diagnosis, and planning midwifery care, by considering priorities. Next, each group's discussion is shared with the whole group, and the midwifery process is developed based on the following learning objectives.

- (1) Pregnancy: Health education during prenatal health examinations
 1. Can perform rapid assessment of the pregnant woman (recognizing abnormalities instantly).
 2. Able to formulate a midwifery diagnosis for gestational age (from visual examination, interview, auscultation, and palpation).
 3. Can conduct health education in accordance with the needs of the target population.
- (2) Labor and delivery: Care during the progress of delivery
 1. Can perform rapid assessment of a pregnant women (can predict rapid delivery progress and abnormalities).
 2. Able to formulate an initial diagnosis.
 3. Able to diagnose the onset of labor and estimate the time required for delivery.
 4. Able to explain the current situation and future predictions to

the birthing mother.

- (3) Postpartum and neonatal period (physical assessment of mother and infant and family planning support)
 1. Can perform rapid assessment of mother and infant (instant recognition of abnormalities).
 2. Able to formulate a midwifery diagnosis for the postpartum period.
 3. Able to implement high priority midwifery care in accordance with the needs of the mother and infant.
 4. Able to explain the current situation and future to the woman after childbirth.
- (4) Attitude
 1. Can independently study prior to simulation learning.
 2. Respects the human rights of the subjects (pregnant women, postpartum mothers, and newborns).
 3. Able to be proactive and willing to work on their own initiative.
 4. Enjoys and participates in simulation learning.

The study period was 170 minutes/session, and the questionnaire (evaluation form and open-ended questions) took about 10 minutes to complete. The students were asked to respond to the questionnaire before and after the study. This study created its own evaluation form with reference to the goals for attainment from Newcomer to Level I of the Proficiency Levels of Midwifery Practice (Critical Ladder) proposed by the Japanese Nursing Association¹⁰⁾, and the five attainment levels for each evaluation item were defined as follows: "5: Very well," "4: Well," "3: Neither well nor poorly," "2: Poorly," and "1: Unable." (Table1)

Statistical analysis

Pre- and post-simulation learning comparisons were made using the Mann-Whitney U-test to calculate correlations. The analysis was conducted using SPSS for Windows 26 with a statistical significance level of less than 5%.

Ethical considerations

To protect the rights of research collaborators, the researcher's status was clearly stated to the subjects, the purpose and content of the research were explained to them in writing, and their consent was obtained. Approval was obtained from the Ethical Review Committee of the university to which the researcher belongs. [Approval Number: No. 19MH060]

RESULTS

The results of the evaluations conducted before and after simulation learning are shown in Table 1. The median scores for all items in (1) Pregnancy, i.e., items 1) to 12), (2) Labor and delivery, i.e., items 13) to 15), (3) Postpartum and neonatal period, i.e., items 16) to 20), and (4) Attitude, i.e., items 21) to 24), were almost all higher after simulation learning. In addition, the evaluation scores after simulation learning were significantly higher for all items in (1) Pregnancy, except for "1) You can explain the significance of the health checkup for pregnant women," "4) You can explain the physical changes in each stage of pregnancy," and "8) You can explain the necessary social resources for pregnant women," (2) Labor and delivery, and (3) Postpartum and neonatal period. As for Attitude, no significant differences were found in all

Table 1: Self-assessment table for midwifery simulation

Subject	Evaluation item	Before learning		After learning		p-value
		median	min-max	median	min - max	
(1) Pregnancy	1) You can explain the significance of the health checkup for pregnant women.	3	2-4	4	2-5	0.371
	2) You can explain the significance of continuing health education provided at each stage of pregnancy.	3	2-3	4	3-5	0.010
	3) You can explain the effect of the pregnancy process on labor and puerperium. (Continuous perspective)	3	2-3	4	3-5	0.026
	4) You can explain the physical changes in each stage of pregnancy.	3	3-4	4	3-5	0.089
	5) You can explain the psychological changes in each stage of pregnancy.	3	2-4	4	3-4	0.048
	6) You can explain the social background of the pregnant women.	3	2-4	4	3-4	0.032
	7) You can explain the normal fetal development.	3	2-4	4	3-5	0.026
	8) You can explain the necessary social resources for pregnant women.	2	2-4	3	3-4	0.065
	9) The midwifery diagnosis during pregnancy can be planed according to the subject.	3	2-4	4	3-5	0.015
	10) You can be implemented using the required technique when the health checkup for the pregnant women.	2	1-3	3	2-4	0.026
	11) The health education during pregnancy can be implemented according to the subject.	2	2-3	4	3-4	0.012
	12) You can suggest the midwifery care according to the subject. (Includes forecasts pregnancy process)	2	2-4	3	3-5	0.008
(2) Labor and delivery	13) The midwifery diagnosis can be planned for the subject who is in labor.	3	2-3	4	3-5	0.020
	14) You can suggest the midwifery care for the subject who is in labor based on the midwifery diagnosis.	3	2-3	3	3-4	0.031
	15) You can propose the labor prediction and early detection of abnormal delivery.	2	1-3	3	2-5	0.034
(3) Postpartum and neonatal period	16) The midwifery diagnosis can be planned for the subjects in the puerperium.	3	2-4	4	3-5	0.010
	17) The midwifery diagnosis can be planned for the subject in the neonatal.	3	2-4	4	3-5	0.010
	18) You can suggest the midwifery care for puerperal women and newborns	3	2-3	4	3-4	0.008
	19) The family planning education can be implemented according to the subject.	2	1-3	3	3-4	0.026
	20) You can suggest social resources for maternal and child health activities.	2	1-3	3	2-4	0.032
(4) Attitude	21) You can do prior learning independently.	4	2-5	4	4-5	0.170
	22) You can respect the human rights (privacy protection etc.) of the subject.	4	3-5	4	3-5	0.174
	23) You can conduct the training independently while cooperating with the learner.	4	3-5	4	3-5	0.490
	24) You can be ambitious throughout the training. (You can enjoy the training per se.)	3	3-4	4	3-5	0.073

Up to 5 points each

of the items: "21) You can do prior learning independently," "22) You can respect the human rights (privacy protection etc.) of the subject," "23) You can conduct the training independently while cooperating with the learner," and "24) You can be ambitious throughout the training. (You can enjoy the training per se.)"

DISCUSSION

In the evaluation table for simulation learning shown in Table 1, the scores after simulation learning were significantly higher for all but 4 of the 12 items in (1) Pregnancy, and for all the items in (2) Labor and delivery and (3) Postpartum and neonatal period. However, when there were (1) No significant differences in (1) Pregnancy, for "1) You can explain the significance of the health checkup for pregnant women," the maximum value was "5: Very well," while the minimum value was "2: Poorly." Similarly, for "4) You can explain the physical changes in each stage of pregnancy," the maximum score was "5: Very well," but the minimum score was "3: Neither well nor poorly," indicating a difference in learning effectiveness (level of understanding). Regarding "8) You can explain the necessary social resources for pregnant women," some respondents provided "4: Well" as their maximum value and others "3: Neither well nor poorly" as their minimum value, indicating that the level of attainment was low even after the simulation learning session. Therefore, these three items can be mastered as content knowledge

through academic study. However, it is important to review the learning objectives and the situations (scenarios) to be set, considering how to utilize knowledge acquired through academic study, to avoid differences in learning effectiveness and improve learning effectiveness through simulation learning.

There were no significant differences in all four Attitude items: "21) You can do prior learning independently," "22) You can respect the human rights (privacy protection etc.) of the subject," "23) You can conduct the training independently while cooperating with the learner," and "24) You can be ambitious throughout the training. (You can enjoy the training per se.)" ¹⁰ This may be because the simulated setting differs from a real clinical setting where direct care is provided to the subject (person), limiting the improvement of learning effectiveness. In addition, to improve the effectiveness of learning as much as possible, it is necessary to consider implementing a simulation learning program that incorporates the principles of the ARCS model . Attention, 2. Relevance, 3. Confidence, 4. Satisfaction—proposed by Keller¹², which is believed to enhance learning motivation.

The survey participants in this study had only been enrolled in their program for three months, which corresponds to the introduction stage of midwifery education. During this period, they must improve their communication skills by sharing knowledge and information among themselves so that they can visualize prenatal situations realistically and communicate smoothly. It is also important for them to promote their professional independence by planning midwifery diagnosis and midwifery care with a clear medical rationale, in line with the needs of the subject and with an ongoing perspective from the period of pregnancy

to the postpartum period. This improves the effectiveness of the learning process, as faculty members, who are more experienced and knowledgeable, can take on the role of facilitators and conduct simulation learning in a way that compensates for the lack of knowledge and skills¹³.

Limitations of the study

This study is problematic for generalization because of the small number of subjects (nine midwifery students who were only first-year university majors). In the future, it will be necessary to increase the number of subjects to include midwifery students in other educational programs and to clarify the effects of simulation learning.

CONCLUSION

In this study, simulation learning (Situation-Based Training) was found to be effective in all situations: (1) pregnancy, (2) labor and delivery, and (3) postpartum and neonatal periods. However, there is no significant effect on the content knowledge surrounding (1) Pregnancy that can be learned academically, and it is important to consider how to utilize the knowledge acquired academically in a scene (scenario). Furthermore, no significant effect was observed for the items in (4) Attitude, thus suggesting that there is a limit to improvement in learning effectiveness. It is because simulation learning is different from clinical settings where people are directly cared for; therefore, it is thought that learning effectiveness is diminished.

CONFLICT OF INTEREST

The author declares no conflict of interest relevant to this article.

ACKNOWLEDGEMENT

This work was supported by JSPS KAKENHI Grant-in-Aid for Scientific Research (C) Number 19K11072.

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