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The Effect of the Implementation of the Postpartum Care Laboratory Skill Integrated Learning Model on Improving the Competence

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Abstract: The conventional laboratory learning model has proven to be inadequate in improving competencies. Therefore, there is a need to develop a learning model that integrates the knowledge gained with the skills and attitudes required when providing care, namely an integrated laboratory skills learning model. The purpose of this study was to analyze the effect of the implementation of an integrated postpartum care laboratory skill learning model on improving the competencies of Diploma-3 midwifery students. This study adopted a quasi-experimental pretest-posttest nonequivalent control group design with 79 students divided into two groups: the intervention group consisting of 39 students from STIKes Indramayu and the control group consisting of 40 students from Poltekkes BPH Cirebon. The intervention group was given the integrated learning model, while the control group was given the conventional learning model. Data analysis was conducted using t-tests, Mann-Whitney tests, and chi-square tests with a significance level of $p<0.05$. The results showed that the pretest competencies of the intervention group were 33 (84.6%) who were not competent, while in the control group, 35 (87.5%) were not competent. There was an increase in competencies in the intervention group by 49% (0-887) and in the control group by 19.4% (0-50.9). Further analysis indicated a significant difference in competency improvement between the group given the integrated laboratory skills learning model and the group given the conventional laboratory skills learning model ($p<0.05$). The conventional laboratory skills learning model was a risk factor causing students to be incompetent with a relative risk of 1.64 (95% CI 1.15-2.35) and NNT 3.2. The Integrated model of laboratory skills has a positive impact on students' skill elevation.

Keywords: Integrated learning model; Laboratory skill; Midwifery; Midwifery skill

Introduction

The postpartum period is a critical phase that carries the risk of maternal morbidity and mortality (De Roose et al., 2018; Rubio-Álvarez et al., 2018). It is estimated that 60% of maternal deaths occur after delivery and 50% of maternal deaths occur within the first 24 hours postpartum. In Indonesia, the highest number of maternal deaths in the postpartum period is caused by hemorrhage and infection (Mahmood et al., 2021). To reduce such cases, in accordance with the competency standards, midwives are responsible for ensuring that every mother has access to safe and comfortable postpartum care, which includes physical and psychological care, providing support in exclusive breastfeeding, preventing and early detecting of possible complications by monitoring the postpartum period within the range of 24 hours to the first week (less than 7 days) to 6 weeks postpartum, making timely referrals, integrating soft skills values by showing empathy and friendliness in providing care, as well as respecting local culture (Coast et al., 2014). One of the

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strategies implemented by the government to reduce Maternal Mortality Rate (MMR) is by improving the competency and quality of midwifery services provided by midwives (Nur et al., 2021; Palimbo et al., 2021).

The establishment of midwifery education aims to meet the public health needs. The quality of midwifery services is closely associated with competent midwives (Roache & Kelly, 2018) High-quality midwives with comprehensive and professional skills can only be achieved by quality midwifery education institutions. However, it is regrettable that the rapid growth of education institutions is not followed by an increase in the quality of midwives. Research findings indicate that current midwifery graduates still lack the ability to respond to the challenges of midwifery service needs and are considered to be of low quality (Adatara et al., 2021). Therefore, it should be gradually improve especially practical in rural areas.

The D-III midwifery education is a vocational education that emphasizes skills, with a larger proportion of laboratory learning (60%) compared to theory (40%). This is aimed at allowing students to practice skills, apply and integrate knowledge gained in the classroom with skills and attitudes before practicing in a clinical setting. This should make a midwife more competent in providing care. However, in reality, the results of the 2013 D-III Midwifery competency test showed that out of 7,936 participants, only 53.5% were deemed competent, even though the passing grade threshold was set at 40.14. Although the current midwifery competency test is still in the form of a written exam with multiple-choice questions based on cases.

Several research findings have indicated that there are still many complaints from practice supervisors about the low competence of midwifery students in understanding concepts and applying postpartum care both theoretically and in real practice situations. The Health Professional Education Quality Project (2010) revealed that midwifery students still lack empathy and friendliness towards patients, and still view them merely as objects of learning. The limited practical experience and the limited availability of practice areas reduce opportunities for direct learning, leading students to memorize theory rather than giving direct care. In addition, obstacles to implementing practical training include inadequate facilities and laboratory equipment, a high student-to-teacher ratio, insufficient up-to-date teaching materials and modules that are not based on journals, thereby making the learning process ineffective in improving competence (Matsuo et al., 2011).

In 2015, initial data on the practical scores of postnatal cares using conventional learning methods from several midwifery institutions showed varying average scores and passing grade standards. Poltekkes Kemenkes Langsa had an average score of 82 with a passing grade standard of 78, STIKes Bustanul Ulum Langsa had an average score of 80 with a passing grade standard of 68. STIKes Indramayu had an average score of 80 with a passing grade standard of 75, while Poltekkes Bhakti Pertiwi Husada Cirebon had an average student score of 84 with a passing grade standard of 68. Although the practical scores were already good, an evaluation of clinical practice showed that midwifery students were still not competent. The effective teaching and learning process in the laboratory should be oriented towards Student Centered, Problem-Based, Integrated, Community Oriented, Early Exposure to Clinic, and Systematic approaches. However, these approaches have not yet been reflected in conventional laboratory skill learning. (Association of Indonesian Midwifery Education Institutions) (Ali et al., 2011).

Several research studies on the application of an integrated theory-based postpartum care learning model indicate that the conventional learning model is a risk factor that causes students to be incompetent (RR=1.46; 95% CI=1.41 to 2.99), while the integrated learning model is capable of increasing student competence by 32% compared to the conventional learning model ($p<0.05$). Furthermore, an integrated study conducted in a clinic was able to increase student competence by 59.5%, with an average increase in knowledge of 20.27%, attitude of 20.27%, and skills of 21.63%, which ultimately led to an increase in patient satisfaction by 40.48% (Aziz et al., 2019)

The implementation of an integrated learning model is a good innovation in the laboratory learning process because this learning model emphasizes the integration of knowledge, attitudes, skills, and their application from various aspects such as methods, learning modules for learning aids, and problem-based approaches. This allows students to practice independently, which makes learning a fun experience and fosters personal growth. The Problem-Based Learning (PBL) approach also encourages active student participation in the learning process (Azer et al., 2013), and the use of case scenarios can develop critical thinking skills and the ability to visualize and connect various disciplines to address challenges (Salameh et al., 2020). The implementation of an integrated laboratory skills learning model requires a laboratory facility that is designed in accordance with the curriculum, in the form of a Simulation Laboratory. This laboratory learning strategy is designed to simulate a clinical environment more realistically in a safe context, centered on the student, encourages small-group independent learning, and uses simulation-based learning with realistic case scenarios. Practical skills learning is guided by a

facilitator, starting from novice to expert, before direct practice with patients.

In this study, the implementation of an integrated postnatal care learning model combines several methods and the use of practical laboratory learning modules. The module also plays an important role in helping students learn independently, become more skilled, and assess themselves in providing care. However, in the midwifery laboratory learning process, learning modules have not been used. During laboratory practice, students are only provided with a procedural guidebook that contains a checklist without an explanation or rationale for why such actions are taken. As a reference for facilitators, the midwifery module developed by the World Health Organization (WHO) can be used as a reference in developing skills teaching modules. However, effective modules must be constantly updated by lecturers and based on evidence-based practice.

Method

Research design

The research design used in this study is a quasi-experimental pre-test post-test nonequivalent control group design, which compares two groups: a conventional group and an intervention group. Competency assessments will be conducted before and after the treatment for both groups. The control group will receive conventional treatment without intervention, while the intervention group will receive treatment that combines an integrated postnatal care learning model with the use of practical laboratory learning modules. This research design is designed to test whether the implementation of an integrated learning model and the use of practical laboratory learning modules have an effect on improving students' competencies in providing postnatal care. The data will be analyzed using appropriate statistical analysis techniques to compare differences between the two groups.

Subject of the research

The subjects of this study are 79 Diploma III Midwifery students, divided into two groups: a conventional group of 40 students from Poltekkes Bhakti Pertiwi Husada Cirebon and an intervention group of 39 students from STIKes Indramayu. The inclusion criteria for the subjects are that they are fourth semester students who have passed the postnatal and breastfeeding care course.

Data collection technique

The data was collected using a questionnaire on motivation and laboratory skill practice module, which was administered both before and after the intervention. This instrument was used to gather data from the participants in both the conventional and intervention groups.

Statistical analysis

The data was analyzed using the t-test and Mann-Whitney test with a significance level of α=0.005, followed by Wilcoxon test. These statistical tests were used to determine whether there were any significant differences between the conventional and intervention groups in terms of their competencies before and after the intervention. While The Impact of Laboratory Skill Learning Model Implementation on Competence Improvement was analyzed using chi square test. All statistical analysis was performed using IBM SPSS v.22

Result and Discussion

Equivalence of subject characteristics

Equivalence of subject characteristics is an important aspect in research design aimed to ensure that the subject groups have comparable characteristics between the treatment and control groups (Lakens et al., 2018). In experimental research, differences in subject characteristics can affect the results and make them invalid. To address this issue, randomization is typically used in selecting research subjects. With the process of randomization, it is hoped that differences in subject characteristics can be eliminated or at least minimized, so that the comparison between the treatment and control groups can be done fairly. This is done to ensure that the effect of the independent variable being studied is the result of the intervention provided and not due to differences in subject characteristics (Nickerson et al., 2007).

In addition, matching can also be done by matching subject characteristics between the treatment and control groups so that there is similarity in subject characteristics in both groups. Therefore, the research results can be more accurate and valid. The subject characteristics equivalency was assessed, and the result is represented in Table 1.

Based on Table 1, it can be observed that in both the intervention and control groups, the analysis of the semester IP data, motivation, and pretest competency indicated no significant differences ($p > 0.05$), indicating that both groups were comparable and suitable for comparison. Comparability of two groups refers to the extent to which two groups being studied are similar or comparable with respect to key characteristics or factors that could potentially affect the outcome of the study. In research studies, comparability of two groups is essential to ensure that any observed differences between them are due to the intervention or exposure

being studied, rather than any confounding variables that might exist between the two groups.

Table 1. Equivalence of research subject characteristics

Characteristics	Group		P values*
	Intervened N= 39	Control N= 40	
GPA			
Mean (SD)	3.35 (0.12)	3.34	
Median	3.33	(0.17)	
Interval	3.15 – 3.67	3.33	0.944*
With honor	6 (15.4%)	3.04 –	
Great satisfaction	33 (84.6%)	3.72	
		8 (20%)	
		32 (80%)	
Motivation			
Mean (SD)	78.1 (6.65)	78.9	
Median	78	(5.18)	
Interval	68 – 88	78	0.572**
High	20 (51.3%)	71-88	
Low	19 (48.7%)	26 (65%)	
		14 (35%)	
Competence score			
(Pretest)	69.6 (14.9)	71.8	
Mean (SD)	67	(15.4)	
Median	53-100	67	0.456**
Interval	6 (15.4%)	47-100	
Competent	33 (84.6%)	5 (12.5%)	
Incompetent		35(87.5%)	

Note: *) *T-Test* **) *Mann-Whitney test*

To achieve comparability, researchers often use methods such as randomization or matching to assign participants to the study groups, ensuring that the groups are as similar as possible in terms of important variables that might affect the study outcome. By doing so, any observed differences between the groups can be more confidently attributed to the intervention or exposure being studied, rather than any differences in baseline characteristics of the groups.

Based on the results presented in Table 2, the application of the laboratory skills learning model has a significant effect on the improvement of competency among the intervention group as compared to the control group. The competency of the intervention group increased by 49%, while the control group only increased by 19.4%. The analysis of posttest competency data using the Mann-Whitney test also showed a significant result ($p < 0.005$).

These findings suggest that the learning model applied to the intervention group was effective in enhancing the competency of the students. The significant difference between the two groups indicates that the learning model provided to the intervention group had a greater impact on the competency of the students than the conventional learning model provided to the control group. The results suggest that the laboratory skills learning model can be considered as an effective approach in enhancing the competency of midwifery students.

Table 2. Differences in the Improvement of Postpartum Care Competence in the two groups before and after treatment

Characteristics	Group		P values*
	Intervened N= 39	Control N= 40	
Pretest			
Mean (SD)	69.6	71.8	
Median	(14,9)	(15.4)	
Interval	67	67	0.456*
Competent	53-100	47-100	
Incompetent	6 (15.4%)	5 (12,5%)	
	33	35	
	(84.6%)	(87,5%)	
Post-Test			
Mean (SD)	95.0 (6.2)	83.3 (9.9)	
Median	100	80	
Interval	80-100	67-100	0.000*
Competent	20	8 (20%)	
Incompetent	(51.3%)	32 (80%)	
	19		
	(48.7%)		

However, it is important to note that the study had certain limitations. For instance, the study was conducted in a specific setting and with a limited sample size. Therefore, the generalization of the findings to other settings and larger populations should be done with caution. Further research is needed to validate the findings and to explore the effectiveness of the laboratory skills learning model in different contexts. Furthermore, a chi-square test was conducted to determine the relationship between the Implementation of Laboratory Skills Learning Model and the Improvement of Competence in Diploma III Midwifery students, and the result is displayed in Table 3.

Table 3. Chi-square test result

Competency	Group		P Value	RR (IK 95%)
	Experiment	Control		
Post-test				
Competent	19 (48.7%)	32	0.004*	1.64
Incompetent	20 (51.3%)	(80%)		(1.15-
		8 (20%)		2.35)

**Chi-square test*

Table 3 presents data on the competency of two groups, the experimental and control groups, who underwent a certain intervention. The competency was measured in terms of post-test scores and categorized as competent and incompetent. From the data, 48.7% of the experimental group were competent compared to 80%

of the control group. On the other hand, 51.3% of the experimental group were incompetent compared to only 20% of the control group. A significant difference was observed between the two groups (p=0.004) with a relative risk of 1.64 (95% CI: 1.15-2.35).

The result suggests that the intervention had a significant impact on the competency of the experimental group compared to the control group. The experimental group had a lower proportion of competent students, but a higher proportion of incompetent students compared to the control group. This could be since the intervention was intended to improve the skills and knowledge of the experimental group, which could have resulted in a more challenging and demanding learning process. This, in turn, could have led to a temporary decrease in the competency level of the experimental group.

The observed significant difference between the two groups indicates that the intervention had an impact on the competency level of the experimental group. The relative risk of 1.64 suggests that the students in the experimental group were 1.64 times more likely to be competent compared to the control group. This finding provides evidence to support the effectiveness of the intervention in improving the competency of the experimental group. However, caution should be taken in generalizing the results to other contexts as the study was conducted in a specific setting.

It is important to note that competency in midwifery involves not only technical skills but also ethical, religious, and cultural values. Therefore, it is essential to consider these factors in the development of a laboratory learning model that can enhance the overall competency of midwifery students. The use of such models can also help in improving the quality of midwifery education and training, which in turn can lead to better maternal and child health outcomes (Utz et al., 2015; Widyandana et al., 2010).

The research presented is in line with previous studies that show the effectiveness of integrated curriculum and learning models in improving student competence. The study by (Klement et al., 2011) found that the implementation of an integrated curriculum can increase medical student competence by 12%, while another study showed that an integrated model of postpartum care can increase student competence by 32%. (Matsuo et al., 2011) also emphasized the importance of integrated learning models in improving student competence and confidence in practicing skills.

The method used in the integrated laboratory skill learning in this study was SCL, case scenarios, and laboratory settings within a simulation laboratory with a module as a self-directed learning aid. The use of case scenarios in practical learning is a trigger for students to think critically and be actively involved in solving problems. The quality of the scenarios and the tutor's performance are factors that affect the effectiveness of learning outcomes, as stated by (Kolahi et al., 2018; Pansuwan et al., 2021).

The use of learning modules is also essential in the implementation of the integrated laboratory learning model. (Mawardi et al., 2014)emphasized that self-directed learning in the learning process is essential in improving students' knowledge. However, the effectiveness of using modules is influenced by students' intrinsic initiative and motivation, which can lead to deeper and more stable learning (Loyens et al., 2008)

The research's results indicate that the conventional learning model is a risk factor that can cause students to be incompetent, with an RR value of 1.64 (95% CI= 1.15-2.35). Integrated learning models can improve students' ability to make diagnoses compared to conventional learning models. This is because students think critically about linking basic science, focusing on patient problems, learning to solve problems, and providing treatment. Conventional learning tends to be memory-based, resulting in less accurate diagnoses (Stay et al., 2018).

Conclusion

In summary, the study shows that the implementation of an integrated laboratory skills learning model for natal care has a significant influence on increasing the competence of D-III midwifery students. The competency improvement rate is 49%, and the NNT is 3.2, indicating that for every three students, one student will become competent if the integrated model is applied. On the other hand, the conventional laboratory skills learning model is a risk factor that causes students to be incompetent, with a risk ratio of 1.64. The integrated learning model applied in this study involves SCL, case scenarios, and self-directed learning modules. Case scenarios are beneficial to encourage critical thinking and active participation of students in problem-solving. The use of learning modules is essential to improve students' knowledge and learning outcomes.

Moreover, the study findings support the previous research that has shown the effectiveness of an integrated curriculum in improving medical students' competence. The integrated learning model is also effective in improving midwifery students' competence. The study emphasizes the importance of using quality case scenarios and effective tutors in achieving effective learning outcomes. Furthermore, the study shows that intrinsic motivation and initiative of students in learning can influence the effectiveness of the learning module.

In conclusion, the integrated laboratory skills learning model for natal care is effective in improving D-III midwifery students' competence. This model can be applied in the teaching and learning process of midwifery courses. The study highlights the importance of using effective learning strategies such as case scenarios, self-directed learning modules, and quality tutors to improve learning outcomes. The findings of this study can be used as a reference for further research in improving the quality of midwifery education.

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Authors Contributions
Formal analysis, Abdurrahman, Cut Mutiah, Halimatussakdiah; investigation, Abdurrahman and Cut Mutiah; resources, Abdurrahman, Cut Mutiah, Halimatussakdiah; data curation, Cut Mutiah: writing—original draft preparation, A Abdurrahman and Cut Mutiah writing—review and editing, Cut Mutiah.: visualization, Abdurrahman and Cut Mutiah; supervision, Abdurrahman; project administration, Abdurrahman. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest
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