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Development of a Postpartum Mother Simulator Tool in Midwifery Education

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A B S T R A C T

Physical examination of postpartum mothers is one of the competencies that must be mastered by midwifery students. The availability of quality simulators that meet the criteria for appropriate technology is a need that must be met immediately by every midwifery educational institution. The purpose of this study was to obtain information on the need to develop a simulator model for postpartum mother simulation patient actors. This research method is a qualitative research study. The research method uses a qualitative descriptive research method to obtain expert recommendations on postpartum mother phantom simulator aids that can help midwifery students learn in the laboratory. The sample consisted of 12 respondents from various backgrounds, namely media experts, midwifery profession experts, midwifery students, and simulation patients with 3 respondents each. The results of this study obtained recommendations on the postpartum simulator model if it was to be developed to meet the elements of convenience, affordable purchase price, easy maintenance, similarity of the model to the anatomy of the postpartum mother's body, and flexibility of the model for case modification that can help students achieve midwifery care for postpartum mothers.

1. INTRODUCTION

Postpartum care is one of the main competencies that must be mastered by midwives, as stated in the Essential Competencies issued by the International Confederation of Midwives (ICM) in 2019. This competency includes skills that are very important for midwives in providing postpartum care, which aims to ensure the physical and emotional well-being of the mother after giving birth. During the postpartum period, midwives must be able to carry out various crucial tasks to support the mother's recovery process after giving birth. These tasks include handling potential complications, providing health education to the mother, and monitoring the development of the mother's overall condition (Fahey & Shenassa, 2013).

Further details regarding the midwife's competency in providing postpartum care include eight main components. One important component that must be mastered by midwives is the competency in monitoring the mother's health during the postpartum period. At this stage, careful monitoring of the mother's condition is very vital, considering that the postpartum period is a vulnerable period for the mother in terms of physical and mental health. This monitoring includes various important aspects such as a complete physical examination, including an evaluation of vital signs that include body temperature, pulse, blood pressure, and respiratory rate (Christiansen et al., 2023). In addition, midwives are also expected to be competent in conducting breast examinations to ensure there is no infection or complications such as mastitis, abdominal examinations to check the uterine involution process, genital examinations to detect possible infections or healing of postpartum wounds, and musculoskeletal system examinations to assess the mother's overall physical condition after the tiring labor process (Pommeret-de Villepin et al., 2022).

In a document published by WHO in 2016, it was stated that the level of competence of a midwife while on duty is greatly influenced by the provision received during the education process. This education not only includes

in-depth theory but also ongoing practice, which aims to prepare midwives to be able to face various challenges in postpartum maternal care (Adnani et al., 2022). The duration of service hours during education does play a role in improving clinical skills, but more than that, strengthening the basics in terms of knowledge and laboratory skills training (skill lab) at the beginning of the education period is one of the key elements in forming competent midwives. Midwives who can provide comprehensive care to mothers after giving birth result from quality learning, which prioritizes a balanced understanding of theory and practical skills (Gavine et al., 2019).

In supporting this learning process, skill labs are a mandatory method to achieve and evaluate student skills in midwifery care for postpartum mothers. Skill labs allow students to practice clinical skills in a safe and controlled environment before they go directly into the field. These exercises must be carried out carefully, both in the campus laboratory and in the practice area, with attention to the effectiveness of the training and strict ethical aspects, to ensure that patients are not harmed (Hudder et al., 2021). The recommended method of learning skills is a stepwise method, where students begin with exercises on phantoms or props using specific scenarios. Only after they have achieved the required level of competence on the phantom are they allowed to perform examinations on real patients, of course under the close supervision of a preceptor. This stepwise approach provides a strong foundation for students to master the skills gradually and ensures that they are ready to face real situations in the field with adequate competence (Maskálová et al., 2018).

The results of a preliminary study conducted in 2023 showed that in using simulated patients on midwifery campuses, there were several important inputs regarding using breast models as learning aids. Simulated patients provided recommendations that the breast models used must meet several important criteria, including comfort for the user, ease of use, and fulfillment of ethical norms that apply in the world of health education (Herlyssa et al., 2023). This highlights the importance of teaching aids that are not only realistic but also ethical in supporting a quality learning process. However, this study has not explored in depth the opinions of students who are directly involved in the learning process, as well as the views of experts in the field of midwifery regarding the criteria for breast models or phantoms recommended for use in the laboratory.

This study aims to fill this gap by exploring more deeply the recommendations of students and experts regarding effective learning media, especially in the competence of physical examination of postpartum mothers. This study is expected to provide insight into the ideal phantom, both in terms of design, function, and ethical aspects that must be met. By knowing the views of students who are direct users, as well as input from experts who have a deep understanding of competency standards, it is hoped that this study can produce more comprehensive recommendations. The results of this study will provide a significant contribution to improving the quality of midwifery education, especially in the aspect of training physical examination skills in postpartum mothers, which is very important to be practiced in a safe and controlled environment before being applied in real clinical situations.

2. LITERATURE REVIEW

1. Midwifery

Midwives are called midwives or wife's companions. The word midwife comes from Sanskrit, namely Wirdhan, which means a wise woman, but some also say that a midwife is an educated shaman. Midwives are a profession that is recognized nationally and internationally with several practitioners throughout the world. The definition of a midwife and its field of practice has been internationally recognized by the International Confederation of Midwives (ICM) in 1972 and the International Federation of International Gynecologists and Obstetricians (FIGO) in 1973 (Telfer et al., 2021).

The definition of a midwife according to ICM, a midwife is someone who has completed a Midwife Education Program recognized by the state obtained qualifications, and is licensed to practice midwifery in that country. She must be able to provide supervision, and care and provide the advice needed by women during pregnancy, childbirth, and the postpartum period, lead childbirth on her responsibility, and care for newborns and children (Jefferson et al., 2021). This care includes preventive measures, detection of abnormal conditions in mother and baby, seeking medical assistance, and carrying out emergency care in the absence of other medical personnel. She has an important role in health counseling and education, not only for the woman but also for her

family and community. The work includes antenatal education, and preparation for parenthood, and extends to specific areas of gynecology, family planning, and child care. She may practice in hospitals, clinics, health units, nursing homes, or other service settings (Ashokka et al., 2020).

Meanwhile, the definition of a midwife according to Law No. 4 of 20219 concerning midwifery, a midwife is a woman who has completed a midwifery education program either domestically or abroad that is legally recognized by the Central Government and has fulfilled the Decree of the Minister of Health number 900 of 2002 concerning the registration and practice of midwives. A midwife is a woman who has attended a midwife education program and passed the exam according to the applicable requirements (Fox & Brazier, 2020).

The development of midwifery services and education in Indonesia cannot be separated from the Dutch colonial era, the era of independence, government politics/policies in health worker services and education, community needs, and advances in science and technology.

a. In 1907 (Era of Governor General Hendrik William Deandels)

During the Dutch East Indies government, MMR and AKB were very high, the birth attendants were traditional healers. Traditional healers were trained in assisting with childbirth but this situation did not last long because there were no midwifery trainers. Health services including midwifery services were only intended for Dutch people in Indonesia (Osseo-Asare, 2023).

b. In 1849

Javanese medical education was opened in Batavia (at the Dutch Military Hospital now RSPAD Gatot Subroto), along with the opening of the medical education in 1851 midwifery education was opened for native women in Batavia by a Dutch military doctor (Dr. W. Bosch) these graduates then worked in hospitals and the community. From then on, maternal and child health services were carried out by shamans and midwives (Sukamto, 2022).

c. In 1952

Formal midwife training began to be held to improve the quality of delivery assistance. Courses for traditional midwives are still ongoing until now, the ones who provide the courses are midwives. Changes in knowledge and skills about maternal and child health services as a whole in society were carried out with additional courses known as additional midwife courses (KTB) in 1953 in Yogyakarta which were eventually also carried out in other big cities (Bogren et al., 2020). Along with this training, the Maternal and Child Health Center (BKIA) was established where midwives were responsible for services to the community. The services provided include antenatal services. Postnatal and examination of babies and children including immunization and nutritional counseling. While outside the BKIA, midwives provide delivery assistance at the family's home and go on home visits as a follow-up effort after delivery (Afrizal et al., 2020).

d. From this BKIA, it finally became an integrated service to the community called the Puskesmas in 1957. The Puskesmas provides services oriented to the work area. Midwives who work at health centers function to provide KIA services including family planning services both outside the building and inside the building. Midwifery services provided outside the building are family health services and services at the Integrated Service Post (Posyandu). Services at Posyandu include four activities, namely: pregnancy check-ups, family planning services, immunization, nutrition, and environmental health (Murni, 2020).

e. Starting in 1990

Starting in 1990, midwifery services were provided evenly and close to the community. This policy was through a Presidential Instruction orally at the 1992 Cabinet meeting regarding the need to educate midwives for placement in villages. The main task of midwives in villages is as implementers of KIA, especially in health services for pregnant women, childbirth, postpartum, and BBL health services, including coaching for traditional birth attendants. In carrying out their main tasks, midwives in villages make home visits to mothers and children who need it, provide coaching at Posyandu in their work areas, and develop maternity huts according to the needs of the local community (Adatara et al., 2021). The above are the services provided by midwives in villages. The services provided are oriented towards public health, unlike midwives who work in hospitals where the services provided are oriented towards individuals. Midwives in hospitals provide antenatal polyclinic services, reproductive health disorders in family planning clinics, pregnancy exercises, perinatal education, delivery rooms, obstetric operating rooms, postpartum rooms, and perinatal rooms (Maheen et al., 2021). Starting from the World Population Conference in Cairo in 1994 which emphasized reproductive health, it requires midwife service areas. These areas include:

1). Family Planning
2). STDs including reproductive tract infections
3). Safe Motherhood including newborns and abortion care
4). Reproductive Health in adolescents
5). Reproductive Health in the elderly

2. Post Partum

The postpartum period is the period that begins after the placenta is born and ends when the reproductive organs return to their pre-pregnancy state, which lasts for 6 weeks or 42 days. During the recovery period, the mother will experience many physiological physical changes and cause a lot of discomfort in the early postpartum, which does not rule out the possibility of becoming pathological if not followed by good care (Martin et al., 2022).

According to Wulandari, there are several stages experienced by women during the postpartum period, namely:

a. Immediate puerperium, which is the period 0-24 hours after giving birth. The mother has been allowed to stand or walk around.

b. Early puerperium, which is 1-7 days of recovery after giving birth. Complete recovery of the reproductive organs lasts for 6- weeks Later puerperium, which is the period 1-6 weeks after giving birth, is the time needed by the mother to recover and be completely healthy. The healthy period can last weeks, months, and years (Björkman et al., 2023)

The mother's body system will adapt again to adjust to postpartum conditions. The organs of the mother's body that experience changes after giving birth include:

a. Uterus

Involution is a process of the uterus returning to its pre-pregnancy condition. This change can be known by performing a palpation examination to feel where the Uterine Fundus Height (TFU) is (Falomo et al., 2020).

b. Lochia

Lochia is the excretion of uterine fluid during the postpartum period. Lochia smells fishy or rancid with different volumes in each woman. Lochia that smells bad indicates an infection. Lochia has changes in color and volume due to the involution process (Huang et al., 2023). Lochia is divided into 4 types based on color and time of discharge:

1). Lochia rubra

This lochia comes out on the first to the 4th day of the postpartum period. The fluid that comes out is red because it is filled with fresh blood, residual placental tissue, uterine walls, baby fat, lanugo (baby hair), and meconium (Gonzalo-Carballes et al., 2020).

2). Lochia sanguinolent

This lochia is reddish brown and slimy and lasts from the 4th to the 7th day postpartum.

3). Lochia serosa

This lochia is yellowish brown because it contains serum, leukocytes, and placental tears or lacerations. It comes out on the 7th to the 14th day.

4). Lochia alba

This lochia contains leukocytes, decidual cells, epithelial cells, cervical mucous membranes, and dead tissue fibers. Lochia alba can last for 2-6 weeks postpartum. Lochia that persists in the early postpartum period shows signs of secondary bleeding that may be caused by the remaining placental membranes. Lochia alba or serosa that continues can indicate endometritis, especially if accompanied by abdominal pain and fever. If an infection occurs, foul-smelling pus will come out, called "purulent lochia". The release of lochia that is not smooth is called "static lochia" (Gao et al., 2024).

c. Vaginal Changes

The vulva and vagina experience pressure and great stretching during the birthing process. In the first few days after the process, these two organs remain loose. After 3 weeks, the vulva and vagina return to their non-pregnant state and the rugae in the vagina will gradually reappear, while the labia become more prominent (DeLancey et al., 2024).

d. Perineal Changes

Immediately after giving birth, the perineum becomes loose because it was previously stretched by the pressure of the baby moving forward. On the 5th day postpartum, the perineum has regained some of its tone, although it remains looser than before pregnancy (Romeikienė & Bartkevičienė, 2021).

e. Digestive System Changes

Usually, mothers experience constipation after giving birth. This is because during childbirth the digestive tract is under pressure which causes the colon to become empty, excessive fluid discharge during labor, lack of food intake, hemorrhoids, and lack of body activity (Bužinskienė et al., 2022).

f. Urinary System Changes

After the birthing process, mothers usually find it difficult to urinate in the first 24 hours. The cause of this condition is spasms of the sphincter and edema of the bladder neck after experiencing compression (pressure) between the fetal head and the pubic bone during labor. The level of the hormone estrogen which has the property of retaining water will experience a marked decrease. This condition is called "diuresis" (Melaku, 2022).

g. Changes in the Musculoskeletal System

The uterine muscles contract immediately after delivery, and the blood vessels between the uterine muscle weaves will be pinched, thus stopping the bleeding. The ligaments, pelvic diaphragm, and fascia that stretch during delivery, gradually shrink and recover. Complete stabilization occurs 6-8 weeks after delivery (Wang et al., 2022).

h. Changes in the Cardiovascular System

After delivery, the shunt will suddenly disappear. Blood volume increases, thus causing cordis decompensation in patients with vitum cordia. This can be overcome by a compensation mechanism with the emergence of hemoconcentration so that blood volume returns to normal. In general, this occurs on the third to fifth day postpartum (Chong et al., 2023).

i. Changes in Vital Signs

During the postpartum period, vital signs that must be assessed include:

1). Body temperature

Within 1 day (24 hours) postpartum, body temperature will rise slightly (37.50 – 38◦ C) due to hard work during childbirth, loss of fluids, and fatigue. If in normal conditions, body temperature will return to normal. Usually on the third day body temperature rises again due to the formation of breast milk (ASI). If the temperature does not decrease, there is a possibility of infection in the endometrium (Kadio et al., 2024).

2). Pulse

The normal pulse rate in adults is 60-80 times per minute. The pulse rate after giving birth will usually be faster. A pulse rate that exceeds 100x/minute, must be aware of the possibility of dehydration, infection, or postpartum hemorrhage (Haddad et al., 2022).

3). Blood pressure

Blood pressure usually does not change. Blood pressure may be lower after the mother gives birth because there is bleeding. High blood pressure during the postpartum period indicates postpartum preeclampsia (Hurrell et al., 2022).

4). Respiration

The state of breathing is always related to the state of temperature and pulse. If the pulse temperature is abnormal, breathing will also follow, unless there is a special disorder in the respiratory tract. If breathing becomes faster during the post-partum period, there may be signs of shock (Purnomo et al., 2021).

3. METHOD

The research method uses a qualitative descriptive research method to obtain expert recommendations on postpartum phantom simulator aids that can help midwifery students learn in the laboratory. The sample consisted of 12 respondents from various backgrounds, namely media experts, midwifery profession experts, midwifery students, and simulation patients with 3 respondents each. The selection of research samples was carried out using a purposive sampling technique. The data collection method uses two methods, namely focus group discussions (FGD) and in-depth interviews. FGDs were conducted on each type of respondent group (media experts, 3

midwifery profession experts, midwifery students, and simulation patients), with a total number of FGDs of 5 FGDs. The FGD mechanism was carried out online via the Zoom application and in-depth interviews were conducted directly. All interview data was recorded with the permission of the respondents and continued with data analysis by the research team to complete the qualitative data coding process (Sarosa, 2021).

4. RESULT AND DISCUSSION

The research results are compiled based on the results of identifying the characteristics of respondents and analyzing the results of qualitative data from respondent recommendations. The following table is a table that describes the characteristics of respondents.

Table 1. Respondent Characteristics

Respondents	Age	Level of Education	Gender
Media Expert			
PM 1	65 Years Old	Professor	Male
PM 2	55 Years Old	S3	Male
PM 3	48 Years Old	S2	Female
Midwifery profession expert			
PB 1	61 Years Old	S2	Female
PB 2	52 Years Old	S2	Female
PB 3	46 Years Old	S2	Female
Midwifery Student			
MK 1	18 Years Old	Student	Female
MK 2	17 Years Old	Student	Female
MK 3	19 Years Old	Student	Female
Simulation Patient			
PS 1	40 Years Old	Senior high school	Female
PS 2	34 Years Old	Senior high school	Female
PS 3	28 Years Old	Senior high school	Female

Based on Table 1, it can be seen from the characteristics of respondents in the age range of 17 years to 65 years, Education level in the range of high school to post-doctoral (Prof). Gender, there are 2 males and 9 females, out of 12 students.

1. Thematic Analysis of Postpartum Simulator Recommendations Based on Media Experts

Figure 1. 6 Recommended Components of a Postpartum Simulator

Based on Figure 1, it can be observed that media experts have identified six key recommendation components. These components are viewed through several perspectives, including the alignment with educational objectives, the level of utilization, purchase costs, maintenance costs, and the compatibility of the model with prevailing values and ethical standards. This framework of recommendations emphasizes the importance of a holistic approach to selecting teaching aids, ensuring that not only are the educational goals met, but also that the tools are practical, cost-effective, and ethically appropriate within the learning environment.

2. Thematic Analysis of Postpartum Simulator Recommendations Based on Midwifery Experts

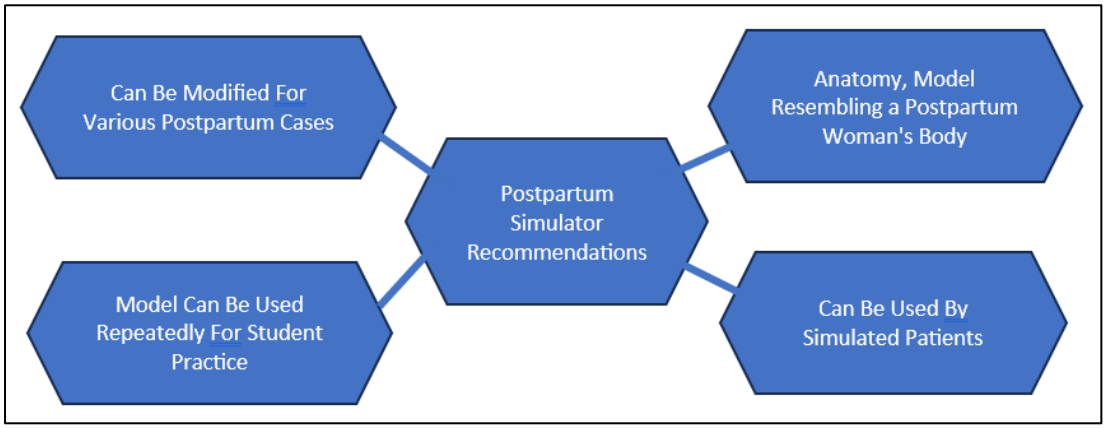

Figure 2. 4 Recommended Components of a Postpartum Simulator

Based on Figure 2, it can be observed that obstetric experts have identified four key recommendation components. These components are centered around the anatomical accuracy of the design and models, the application of simulated patients and student case studies, and the flexibility of the models to be modified for various postpartum cases. This approach underscores the need for realistic and adaptable tools that can effectively simulate a range of postpartum scenarios, providing students with comprehensive hands-on learning experiences that are crucial for developing their clinical competencies.

3. Thematic Analysis of Postpartum Simulator Recommendations Based on Student Perspectives

All respondents expressed their perspectives on the recommended simulators for postpartum care by highlighting several important components. They emphasized that the simulators should be easy for students to use, facilitating the learning of midwifery care competencies related to postpartum mothers. Additionally, the respondents pointed out that these simulators should be durable, allowing for repeated use without the concern of damage or wear. The following statement sentences provide evidence of these perspectives:

a. "I really hope that the phantom model of postpartum mothers is easy for us students to use to practice the competencies of the postpartum care course (MK1)".

b. "I was traumatized to use the phantom which is expensive and I accidentally damaged it so I hope this postpartum mother model can be used more durable and is cheap (MK 3)".

This feedback reflects the need for practical, long-lasting educational tools that can withstand frequent use while maintaining their functionality, ensuring effective training for students in postpartum care.

4. Thematic Analysis of Postpartum Simulator Recommendations Based on the Perspective of Simulation Patients

All respondents provided recommendations for simulators designed for postpartum mothers, emphasizing two key aspects: ease of use and comfort during application. These features are considered essential to ensure that the simulators not only facilitate effective learning but also provide a user-friendly experience for students. The following statement sentences offer supporting evidence for these recommendations:

a. "I have used a model that made me sweat a lot and had difficulty moving. I hope the new model will be comfortable to use and can move easily (PM 2)".

b. "I am very happy if I can still go to the toilet easily when I use the model/phantom.... (PS 3)".

These recommendations highlight the importance of creating simulators that are intuitive for students to operate and comfortable to handle, contributing to more effective training in postpartum care.

Based on the results of this study, it is evident that all respondents provided recommendations regarding the postpartum simulator model from their respective perspectives. Most respondents shared a common viewpoint that the recommended simulator model should be easy to use by all involved components, including students, simulation patients, and lecturers. This focus on ease of use aligns with the opinions of model experts, as noted by Stewart and Fiona (Coffey et al., 2015). Their research underscores the importance of simplicity in design to enhance usability across different users, ensuring effective learning and teaching experiences.

In addition to usability, some respondents, particularly media experts and students, emphasized that the simulator design should be affordable or low-cost. They argued that an affordable model would not only assist educational institutions in acquiring and maintaining these tools but also help students mitigate concerns regarding potential damage during use. This anxiety reduction could lead to a more relaxed learning environment. These views are consistent with the recommendations made by Harahap and the WHO, both of which advocate for low-cost laboratory aid models to support educational efforts in healthcare training.

Specifically, based on the opinions and recommendations of obstetric experts, it was emphasized that the anatomical similarity of the simulator model to the postpartum mother's body is crucial. This aspect is predicted to significantly aid students in visualizing and abstracting the scenarios when practicing, thereby enhancing their ability to engage in role-play or case simulations conducted in the laboratory. The importance of anatomical accuracy is aligned with the recommendations of Zhang et al. (2019) and Downer et al. (2020), both of whom assert that models used in health education should closely resemble the real human body to ensure effective learning and skill development.

Another important recommendation that emerged from the study is the need for flexibility in the postpartum simulator model to accommodate a variety of postpartum cases that may be simulated. This flexibility is expected to improve the efficiency and effectiveness of case-based practice for both lecturers and students, allowing them to address diverse clinical scenarios in a controlled learning environment. This recommendation corresponds with the findings of Stodley et al. (2020), who advocated for simulator models that can be modified to meet the needs of different simulation cases, ensuring a comprehensive and adaptable learning tool for health education.

5. CONCLUSION

Based on the results of this study, the recommendations for postpartum simulators encompass several key aspects: convenience of use, purchase price, ease of maintenance, anatomical similarity to the postpartum mother's body, and flexibility for case modification. These factors are essential for helping students effectively achieve competencies in midwifery care for postpartum mothers. The convenience of use ensures that the simulator can be easily operated by students and instructors, enhancing the learning experience. An affordable purchase price and ease of maintenance are critical for educational institutions to manage costs and ensure the simulator remains in good working condition over time. Anatomical accuracy is crucial for realistic practice and understanding, while flexibility allows for a range of postpartum scenarios to be simulated, improving the comprehensiveness of training. Based on these recommendations, it is anticipated that future development of postpartum simulator models will integrate these elements, resulting in tools that better support the educational goals and practical needs of midwifery students. The aim is to create a simulator that aligns with these recommendations, thereby enhancing the quality and effectiveness of postpartum care training.

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