Higher Education Studies; Vol. 14, No. 3; 2024
ISSN 1925-4741 E-ISSN 1925-475X
Published by Canadian Center of Science and Education

Development of Newborn and Umbilical Cord in A Low-cost Model for Teaching and Training

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Received: June 18, 2024 Accepted: August 6, 2024 Online Published: August 13, 2024

doi:10.5539/hes.v14n3p163 URL: https://doi.org/10.5539/hes.v14n3p163

Abstract

Each year, nursing schools spend more on classroom supplies at the nursing lab to help nursing students develop their practical skills before clinical internships. To teach nursing students how to prepare for their experience in the clinic, the nursing school needs to purchase a variety of teaching tools. The objective of this study was to create a low-cost model of a newborn and umbilical cord so that nursing students could practice cutting severing newborns' umbilical cords in the nursing laboratory until they were proficient before entering the delivery department to care for newborns. The newborn and umbilical cord in a low-cost model was created in association with the nursing and engineering faculties. We created the differences between the original newborn model and the newborn and umbilical cord in a low-cost model: The newborn and umbilical cord in a low-cost model can move its limbs and use the remote to control the operation, in contrast to the original newborn model which can't move and doesn't cry. Data were collected from expert interviews and newborn and umbilical cord model tests using an assessment form. Data were analyzed using Descriptive statistics and content analysis.

The newborn and umbilical cord model is made from a hose that is cheaper and simple to cut, it is like a real umbilical cord so we can make our mannequins at a very low cost and effective.

Newborn and umbilical cord in a low-cost model can be used in practice. Reduce the cost of ordering teaching supplies.

Keywords: development, newborn model, umbilical cord, low-cost model, teaching and training

1. Introduction

Faculty of Nursing Its main mission is to produce nursing personnel who are knowledgeable in both professional and related sciences. Nursing graduates must be able to apply knowledge in midwifery practice appropriately and efficiently. Have a good attitude towards the profession, morality, ethics, and leadership. Have good judgment in analyzing problems and good decisions. Thailand Nursing and Midwifery Council had Midwifery Practices Standards 2019, which consists of 9 standards as follows: 1) General midwifery practice 2) Antenatal care 3) Intrapartum care 4) Postpartum care 5) Life-saving midwifery practice 6) preserving professional ethics, midwifery service recipients and ethics 7) Standards for improving the quality of midwifery practice 8) Standards care management 9) Standards for recording and reporting. Both theoretical and practical instruction on maternal and newborn nursing and midwifery practicum is provided in Thailand as part of the bachelor's degree program in nursing science compiling a minimum of 12 credits. (Ministry of Education, 2017) Maternal and Newborn Nursing and Midwifery Practicum, the delivery department will serve as a practicum for nursing students. which is required to give nursing care during delivery and newborn. Furthermore, for nursing students practicing in the delivery department, delivery is a crucial and core competency in the practical course evaluation requirements.

The practice of caring for the clients of the service provider is the primary focus of the nursing profession. As a result, the core of the nursing program is practical teaching, where nursing students apply theoretical knowledge

to service recipients. Both maternal and newborn nursing care, which calls for specialized knowledge, are required for the midwifery nursing practicum. Nursing students must hone their skills before practicing in the clinic. Thus, before starting their hands-on training in the clinic, nursing students need to hone their nursing skills in all activities.

Nursing students who are enrolled in the maternal and newborn nursing and midwifery practicum must complete clinical practice in the delivery department to deliver care for nursing mothers and newborns. Therefore, before practicing in the clinic, nursing students need to practice operating in nursing laboratories to be proficient in ensuring the safety of service recipients and build confidence for nursing students (Kainer, 2014). It is imperative to set up teaching and learning activities in the laboratory using efficient teaching resources so that students can pick up knowledge quickly and accurately as a result, learners' behavior changes under the teaching objectives correctly and appropriately (Morgan, 2006). Many media are used in laboratories nursing to teach and learn health sciences, including models and computer programs (Wipada, 2015). In nursing laboratories, the model is a popular instructional media that allows students to practice a variety of skills under the learning objectives. Instructor provides close guidance to ensure that nursing skills and abilities are developed under academic principles. Capable of conducting sound, principled analyses and accurate evaluations of nursing practice. In addition to using the understanding acquired from the theory section (Monthathip, 2014). Additionally, it will assist students in developing the right skills because nursing students have the chance to practice skills from models regularly until they become proficient it boosts confidence and lessens anxiety (Umasawan, Nadsuda & Jirawan, 2022).

Each year, nursing schools spend more on classroom supplies at the nursing lab to help nursing students develop their practical skills before clinical internships. To teach nursing students how to prepare for their experience in the clinic, the nursing school needs to purchase a variety of teaching tools, including the newborn model, which is quite expensive. To lower teaching and training costs, it is crucial to develop the newborn model of education. Consequently, to equip nursing students with competent delivery techniques and necessary practice cutting the newborn's umbilical cord to become proficient. To reduce production costs compared to imported mannequins, the researcher created a newborn mannequin with an umbilical cord set. Able to move with ease boosts educational resources while cutting expenses exercise can be repeated by students as needed, and most significantly, it will improve their nursing practice abilities. This has an impact on the hospital's service quality and service recipient satisfaction.

2. Methods

The device and materials assembled the newborn and umbilical cord in a low-cost model for Teaching and Training, as shown in Figure 1, 2.

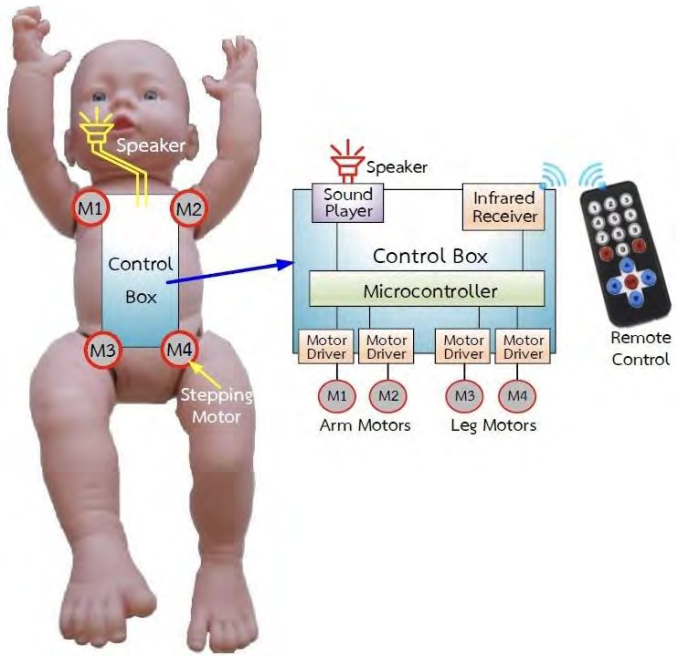

Figure 1. Block diagram of movement controller of newborn model

2.1 Operational Function

1. The arms and legs of the newborn model move with a cry that controls starting and stopping by remote control.
2. Movement and cry patterns have two functions: automatic and manual.
3. Movement speed and cry volume can be adjusted by remote control.

Figure 2. Newborn and umbilical cord in a low-cost model

2.2 The Procedure is As Follows

1. Start and stop the puppet's limb movements as well as the newborn's crying sound by using the remote control.
2. There are automatic and manual forms of crying and movement.
3. It has remote controls that can change the crying volume and movement speed.

2.3 Participating and Methods

The 30 purposive samplings were selected by the Nursing Professor Nurse and Engineering Professor. Data were collected from expert interviews and newborn and umbilical cord model tests using an assessment form.

2.4 Data Collection Tools

The instruments used for data collection were the newborn and umbilical cord model assessment a total of 12 items totaling 60 points. These were rated on 5-point Likert scales (1–5 points) with the following ratings: lowest, low, moderate, high, and highest. The interpretation of the scores was divided into the following five levels of skill: lowest (1.00–1.50 points); low (1.51–2.50 points); moderate (2.51–3.50 points); high (3.51–4.50 points) and highest (4.51–5.00 points). The instruments were examined by five qualified experts who tested for validity and item-objective congruence (IOC). The validity assessment was 0.92. The reliabilities of these instruments were tryout with 30 samples by finding Cronbach's alpha coefficient (α–coefficient), which equaled 0.94.

2.5 Data Analysis

Data were analyzed using Descriptive statistics and content analysis.

2.6 Ethical Considerations

This research project was considered and certified by the Institutional Review Board on Research Involving Human Subjects, Rajamangala University of Technology Thanyaburi, Project Code: RMUTT_REC No. Exp 72/65 on 17 October 2022.

3. Results

Data was collected using semi-structured interviews with Nursing Professors 50%, Nursing 33.33%, and Engineering Professors 6.67% conducted in October and November 2022. Demographic data of the participants.

Table 1. Demographic data of the participants

Participants ID	Gender	Experiences of caring /teaching (Year)
NP1	Female	19
NP2	Female	18
NP3	Female	20
NP4	Female	17
NP5	Female	15
NP6	Female	22
NP7	Female	20
NP8	Female	15
NP9	Female	14
NP10	Female	17
NP11	Female	16
NP12	Female	18
NP13	Female	12
NP14	Female	10
NP15	Female	15
NS16	Female	15
NS17	Female	14
NS18	Female	13
NS19	Female	15
NS20	Female	14
NS21	Female	16
NS22	Female	20
NS23	Female	19
NS24	Female	18
NS25	Female	19
EP26	Male	12
EP27	Male	15
EP28	Male	20
EP29	Male	19
EP30	Male	10

The Expert opinions on trying out the newborn and umbilical cord model found that the creativity and possibilities of commercial development to the highest scores and the materials used are appropriate high scores.

Table 2. Expert opinions on the newborn and umbilical cord model

Assessment issues	$\bar{x}$	S.D.	Level
Design techniques and working systems	4.73	0.44	Highest
Appropriate model	4.60	0.49	Highest
Realism	4.76	0.43	Highest
The materials used are appropriate.	4.33	0.60	High
The quality of materials	4.16	0.59	High
Safety	4.80	0.40	Highest
Effective	4.56	0.62	Highest
Efficiency and investment worthiness	4.83	0.37	Highest
Creativity	4.93	0.25	Highest
New Creation	4.63	0.55	Highest
Able to work on the following objective	4.70	0.46	Highest
Possibilities of commercial development	4.93	0.25	Highest
Overall	4.66	0.45	Highest

4. Discussion

The newborn and umbilical cord model has operational functions: 1) The arms and legs of the newborn model move with a cry that controls starting and stopping by remote control. 2) Movement and cry patterns have two functions: automatic and manual. 3) Movement speed and cry volume can be adjusted by remote control. It is made from a hose that is inexpensive and simple to cut, it is like a real umbilical cord and is very low-cost and effective. The Expert opinions about testing the newborn and umbilical cord model discovered that the creativity and possibilities of commercial development to the highest scores and the materials used are appropriate high scores. This result is consistent with research by Rattanapenporn et al., (2022) who found that the developed water-pressure control mannequin revealed a higher statistically significant average score on quality than the original mannequins as a p-value <.05. and, the water-pressure rubber mannequins are suitable for teaching in maternal and newborn nursing and midwifery subjects. It is appropriate for practicing uterine contraction assessment skills for nursing students to prepare before practicing in the hospital. Therefore, the creation of mannequins is encouraging and facilitating learning for nursing students. Because it can be felt and experienced, it operates more effectively. As such, the developed mannequin's cost-effectiveness is an advantage. Furthermore, it was shown that using models to support instruction in practice and demonstration would improve nursing students' achievement and memory permanence (Umasawan, Nadsuda & Jirawan, 2022; Winai, Sarawut, Punnapa & Jadsada, 2017; Patamamas, Kittiporn, Tharinee & Jaroonrat, 2013).

The safety of newborns is a priority, models serve as a medium for simulating nursing practice skills so that nursing students can become proficient before practicing in the clinic. Nursing students' inability to cut the umbilical cord to assist with delivery will result in delays, increase the Maternal and newborn risk (WHO, 2014), and lead to umbilical cord infections if sterile techniques are not good it can be a pathway for bacteria that can cause newborn sepsis and death (Patricia & Siobhan, 2017; Peter et al., 2017; Liu et al., 2015). Acquiring knowledge through diverse methods and approaches not able to read or learn from only textbooks. Observation and practices prior to the nursing student giving the patient nursing care before they have practiced until proficient. Being unconfident can cause issues for a nurse's practice. Nursing students can improve practical skills by using the created models repeatedly for practice (Supalak & Dolrat, 2015). Developing models as teaching media for understanding and practicing important skills is necessary before nursing students begin practicing in the clinic. Therefore, the newborn and umbilical cord in a low-cost model can be used as a medium for demonstration and practice in the nursing laboratory. It can be used as a medium for nursing students to study on their many times to practice their skills until they become proficient. (Tharinee & Pattamamas, 2021 & Mahasneh et al., 2021) aligns with the research of Susanha et al., (2018) who developed a vaginal exam simulation box for labor progression assessment training. By using wood and rubber materials to develop a vaginal exam simulation box to practice evaluating the progress of labor. The rubber used makes it flexible and maintains a shape like human tissue can be used for teaching and learning and consistent with the study of Wichaya et al., (2018) Development of “DeeTorJai” model for chest compression training among nursing students. Studying the development of the FON CMU breast model for teaching breastfeeding. It was found that breast models can be used as teaching materials for breastfeeding. And aligns with the research of Jiraporn & Somchai (2018) study about Developing simulation model for fetal position assessment training skill found that the quality of the model has the highest average score and can be used as a teaching tool for evaluating rotate the fetus in utero. Including the study of Susanha (2016) study of developing stimulation model for training clinical skill of health science students found that models are the key to developing and increasing knowledge in health science.

The Expert opinions on trying out the development of newborn and umbilical cord in a low-cost model for Teaching and Training found that: Quality overall average is the highest score. It is made from a hose that is cheaper and simple to cut, like a real newborn umbilical cord, and is very low-cost and effective. As a result, using the newborn and umbilical cord in a low-cost model to improve practice skills for students is another crucial option that is thought to be a valuable experience. Students can practice cutting a newborn's umbilical cord to increase their knowledge, comprehension, and proficiency most importantly, it will give students more confidence when they practice it frequently before using it in the clinic. Additionally, it reduces the cost of importing newborn umbilical cord models from abroad.

5. Conclusions

The newborn and umbilical cord in a low-cost model can be used in practice. It is made from a hose that is cheaper and simple to cut, like a real newborn umbilical cord and is very low-cost and effective also. Reduce the cost of ordering teaching supplies.

Acknowledgments

We greatly appreciate the Rajamangala University of Technology Thanyaburi Research and Development Institute for approving the study use of human subjects in research. We would also like to thank every team member who took the time to participate in this study.

Authors contributions

Asst. Prof. Dr. Umasawan Chooha were responsible for study design and revising. Petcharat Techathawewon was responsible for data collection. Assoc. Prof. Dr. Somchai Biansoongnern created the newborn and umbilical cord in a low-cost model. All authors read and approved the final manuscript.

Funding

Not applicable

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Canadian Center of Science and Education. The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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