

The Making of A Low-Cost Breast Anatomical Model As A Simulator For Breast Self-Exam

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Abstract. Self Breast Examination Practice (BSE) requires the help of a breast model so midwifery students can learn to detect breast cancer as early as possible easily. This study aimed to develop a cheap and easily accessible breast model for BSE clinical practice learning through the manufacturing stage, expert team validation, and small group trials of students. This research method is 'Research and Development' (Research and Development / R & D). Type of qualitative research. The results in this study of breast models are categorized as low-cost products and appropriate technology. The conclusion in this study is that breast models made can be used as teaching aids for clinical practice of BSE in midwifery students. It is recommended to conduct further research, namely a trial study with respondents or a large sample or commonly referred to as a mass trial.

1. Introduction

As cancer that can be said to be very common in both developed and developing countries [1], breast cancer has become an essential factor in the global burden of disease. It is known that women in the world are at risk of contracting breast cancer with a quite fantastic number, that is, 23 percent of all cancers suffered by women. This cancer was believed as the most common cancer in the entire population, with 1.15 million cases found in 2002, which made it the most common cancer among women. If diagnosed at an early stage, this cancer will be more likely to be treated so that the patient can survive in the longer term. Practical routine breast examination [2] can be one of the things that can detect breast cancer early, one of which is breast self-examination (BSE). Mufida et al .'s research in 2015 proved by training using a direct learning model of self-breast examination (BSE) competency towards knowledge and skills in health cadres [3]. This study also supports Andani's research in 2017 on practical learning methods that have a significant relationship with the mastery of the material in lectures [4].

As candidates for health professionals, midwifery students, and students with other health science backgrounds need to be taught the clinical skills of BSE using inexpensive tools in their supply but useful as teaching aids (simulators). For this reason, we developed a breast model to be used as a simulator for BSE.

2. Methods

2.1. Design

We used Research and Development (R&D) to develop a simulator for BSE clinical skills. This framework starts from 1) potential and problems, 2) data collection, 3) product design, 4) design validation, 5) design revision, 6) testing, 7) product revision, 7) testing, 8) product revision, and 9) mass production.

R&D is also a process of examining consumer needs and then developing products to meet those needs. The aim of R&D efforts in education is not to formulate or test theories but to develop effective products for use in schools. Products are developed according to detailed specifications. After completion, the product is tested in the field and revised until a predetermined level of effectiveness is achieved.

2.2. Subject and data collection

The research subjects in our study as the informants were those who fulfilled two or more of these criteria:

- Model expert consultant,
- Expert in medical education,
- D IV educator midwife, and
- Active clinical practitioners and educators or trainers in the midst of midwifery.

We used snowball sampling [5] until the saturation point. The research instrument was the researchers themselves using interview guidelines referring to the female reproductive anatomical model, specifically the anatomical forms associated with the breast and BSE examination procedures.

Data collection was carried out through in-depth interviews and observations focused on the suitability of breast models with tumor-indicated bumps, and the benefits of models as a BSE clinical learning simulator. Data analysis was carried out by organizing the opinions of experts into the characteristics of the female reproductive anatomy model associated with the function of this model as a learning simulator. The categories in the data analysis focused on the shortcomings and suggestions for improving breast model to be more useful for use as a clinical laboratory learning simulator. At the end of the research processes, we invited midwifery lecturers to gather their opinions out our final product and analyzed the results with a phenomenology approach [5].

2.3. Ethical clearance

This study adhered to the applicable research procedures, i.e., the Licensing from the Research Research Ethics Committee of the Yogyakarta Health Polytechnic of the Indonesian Ministry of Health.

2.4. Model making procedure

The model was made through the following stages:

- First making of the model
- First validation by the experts
- Second making of the model
- Second validation by the experts
- Third making of the model
- Third and final validation by the experts

3. Results and Discussions

3.1. The making and validation of the model

3.1.1. *First making.* After gathering enough information about the model we would develop, we made a breast model by selecting ingredients that could easily be obtained around us. The material selection was based on the principle:

- easy to get,
- cheap,
- durable,
- technically realistic, and
- safe.

Taking these principles into account, the materials collected were:

- Elastic fabric material (t-shirt material), the color resembling skin color designed to be like upper clothing for women to be applied to simulated patients;
- The ingredients for the breasts consisting of elastic materials and foam (dacron) to make the breast feel springy;
- Brown cotton for making mamme areola and nipples;
- Materials for cancer detection, i.e., green bean/soybean granules/or coagulated material giving the impression of 'tumor'; and
- Other materials to support the manufacture of this model, such as yarn and fabric adhesive.

After all the ingredients were collected, the next step was to make the breast pattern as previously observed so that the pattern was ready to be sewn and could be glued to the breast model.

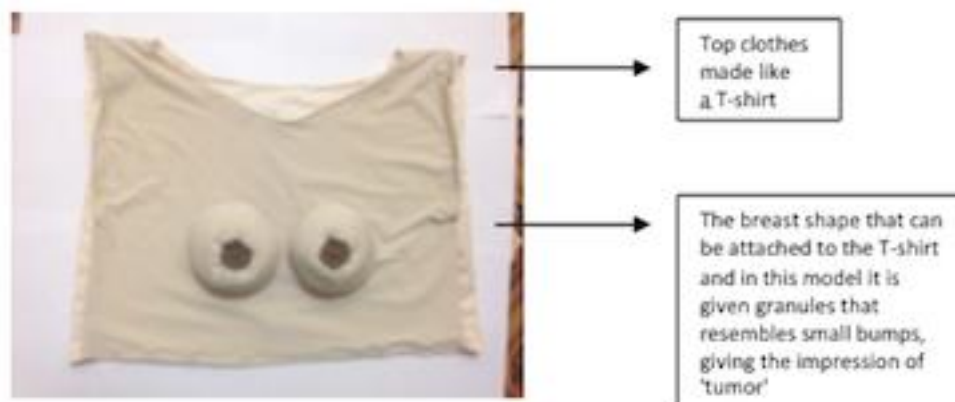


Figure 1 Product at first phase

After the completion of the first phase, the product would pass the validation one by the experts based on evaluations from these experts.

3.1.2. *First validation.* The breast model made was then validated by the experts. The experts are from oncologists, S2 medical education graduate, and a senior midwife. The results of the model validation would then be input to revise the model. In this research, validation was carried out up to 3 times to get a model that was close to reality with the criteria of 'low cost.'

The results of the first validation were that the model was not realistic because the breast was put outside the T-shirt. According to the medical education expert, the breast model should be placed inside the T-shirt. In addition, the oncologist said that the lumps in the breast model should be made from capsules of Vit A or fish oil capsules to give the impression of elasticity.

The following is the opinion of the oncologist, midwife lecturer with medical education background, and one midwife practitioner:

Table 1. Informants' Opinion in the First-made Model

No	Informant	Opinion	
		Anatomical Structure	Model Realism
1.	Oncologist	The anatomical structure is representative, but it may need to be tidied up again and also the distance to the two breasts is too close	Some already realistic... but (while holding the lumps on the model) they are still less elastic ... Please go to the tailor to modify this lump more elastic; it might be replaced with Vitamin A capsules (while touching the lump in the breast model)
2.	A medical education expert	(Looking while holding the model), Efforts to make similar breasts are good, only it will be better if these breast circles are located behind the outer wrapper. (While pointing and moving the breast model). This model is perfect for BSE learning as a hybrid simulator for simulated patients (while nodding)	It feels like a small lump like green beans, soybeans, and also like small marbles. It's good, but try to make it become softer so it doesn't give the impression of being stiff (while feeling every lump on the breast model) This is less realistic form; the breast is outside, preferably the breast model is placed inside the T-shirt.
3.	A midwife practitioner	(Looking while holding the model), I think the shape is funny ... the breasts are really round. The distance is also too close to each other. Can it be fixed?	It can be too ... but the lump feels hard ... try looking for softer ingredients for this lump (while occasionally twisting the lumps around the breast)

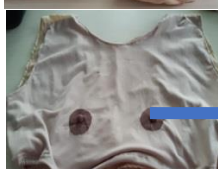
3.1.3. *First revision.* The first revision produced a more realistic model because the position of the breast was inside the T-shirt.



Various forms of the inside parts of the breasts that give the appearance of lumps



Each form of the inside part of the breasts is given cloth adhesive



The outer part of the T-shirt is given nipples

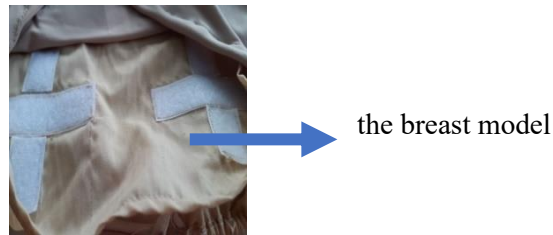


Figure 2. The second made model after the first revision



Figure 3 The front and the rear second made model ready for use by simulated patients

3.1.4. *Second validation.* The model that had been made at the making phase 2 had been considered good by the experts. However, the S2 medical education expert suggested that we could buy a bra in which there was foam so that the time of making breast models for BSE could be shortened. After all, the bra that is sold in the market and it is easy to obtain is also cheap and does not cost money and time (Table 2).

Table 2. Informant Opinion (Second Phase)

No	Informant	Opinion	
		Anatomical Structure	Model Realism
1.	Oncologist	(Looking while holding the model), No, this is approaching but still hmmm ... (looks thoughtful) it seems the shape of the breasts is not yet realistic ... that means this one (while pointing to the model) is too round. Is it still possible to improve ... it's better than the first.	Now this is pretty good, the lump is more felt (while feeling the bumps on the model) only still less elastic ... try this lump (while showing and feeling the lump) to be replaced with Vit A capsules.... if you feel it ... it's thick
2.	A medical education expert	(Looking while holding the model), This one is better; the look is more realistic because the breast is not attached to the outside of the wrapper that resembles a shirt. Only if it can be around the mammary areola and the milk nipples are made slightly wrinkled. This can indicate an advanced stage of breast cancer.	The lump is felt, but the thickness is not 'biting'. Try using fish oil or others that can show 'the taste of chewy granules' Try to use a Bra that is sold on the market. I think I saw a bra that is suitable for your model.
3.	A midwife practitioner	(Looking while holding the model), This is much better than the first one, is more pleasing to the eye ... only if the outside part is not too round.	It's already felt ... not so hard, try if it's still possible to choose ingredients that are chewy like rubber but solid

3.1.5. *Second revision.* The result of the second validation was the created model part 3 that was more refined by buying ready-made Bra for teenagers. In the bra, there was already foam so that in this foam vit A capsules could be affixed. In addition, this bra could also be added both the normal nipple model and the retracted nipple giving an impression of breast cancer at an advanced stage.



Figure 4. The final product with normal and abnormal nipples

3.1.6. *Final validation.* After the completion of the making of the model part 3, the next step was the final validation by the experts. The oncologists, a midwife with a master's degree in medical education, and a midwife practitioner said that the final product of this study could already be used as teaching materials for BSE skills.

3.2. *Testing with midwifery teachers as respondent.*

After the model was finished, we asked for the opinions of the lecturers to do FGD by proposing four questions related to the quality criteria of the model, i.e., realistic, durable, cheap, and safe. We used snowball sampling; that is, if the desired results were the same from several respondents, the results reflected the final results of the interviews. After three lecturers said the same thing, the researcher did not continue to look for other lecturers' opinions.

The three lecturers gave the same opinion so that, according to snow-ball sampling, data search was stopped when the opinions of respondents were stated to be the same or tend to be the same. Therefore, the research was continued by forming an FGD with midwifery student respondents.

3.2.1. *Realistic.* From the opinions of these lecturers, breast products for BSE can be categorized as realistic as teaching or training simulator. Realistic impressions are very important to highlight in making products as a teaching simulator [6] because trainees or students can imagine the real situation or anatomy of humans.

In the world of health education, simulations offer good coverage for the training of interdisciplinary medical teams. Realistic scenarios and tools make it possible to retrain and practice until someone can master the procedure or skill. More and more health institutions are now turning to simulation-based learning.

Situations and scenarios that are simulated with realistic teaching simulators can give students a realistic experience for health cases, such as BSE implementation. Realistic simulator tools or models can help in making the books and training material come alive. This helps ensure that students and trainees gain clinical experience without having to depend on the opportunity to meet certain cases, such as breast cancer. Many also believe that simulation-based learning with a realistic simulator model will increase the efficiency of the learning process in a controlled and safe environment.

3.2.2. *Durable.* The lecturers stated that they were not afraid of breaking this tool because this breast model for BSE made from fabric was durable. Tools or simulators that are durable are needed by students or trainees so that they can repeatedly practice until they are truly proficient with the skills learned, in this case, the practice of BSE.

Teaching aids or medical training simulators must be flexible and durable. Repetition is a very important part of learning a skill, without exception BSE. With the existence of breast models for BSE

that are durable, the procurement of simulator models is not done frequently because the tools used are not easily damaged.

3.2.3. Cheap. Clinical learning requires low-cost, but good quality teaching aids or simulators [7] are needed in the world of training in certain health skills, such as BSE. When the tools needed for simulating health scenarios are cheap, the procurement of these tools will not be too difficult for certain institutions. Therefore, as cheap, breast models for BSE in this study can be categorized as 'low-cost'.

3.2.4. Safe. When the product used for teaching aids is considered safe, students and trainees can comfortably use the model to master the skills taught. Product safety includes in terms of the materials used, the sharpness of the equipment, or harmful radiation that might occur [8]. This breast product for BSE does not contain any harmful materials, nor does it have a sharp surface or tip, nor does it emit harmful radiation.

With the opinions of these lecturers, i.e., that breast products for BSE produced by this study are cheap, safe, durable, and realistic, these products can be categorized as appropriate technology products. This R&D was conducted to model breasts that have features of lumps, such as signs of breast cancer. It is necessary to note that the level of breast disease among women in Indonesia is still high so that this model is expected to be a useful contribution in educating health students, especially midwifery, to train women to check their breasts (BSE).

Health workers, especially midwives, are those who are likely to deal with breast cancer cases so that they are required to be competent and responsive to the situation. Therefore, all midwifery students must be provided with ways to advocate for women in BSE by giving examples of BSE through training, which of course requires the right equipment.

4. Conclusion

This study is the result of a breast model validation that can be used to help BSE clinics in midwifery students. Research and Development (R & D) have succeeded in producing BSE with criteria that are challenging, inexpensive, durable, and safe. With this consideration, this product can be categorized as a low-cost product. For this reason, this product is ready for further research. Namely, experimental studios with large numbers of samples commonly referred to as mass trials.

Reference

- [1] Global Health Estimates. WHO. 2013.
- [2] Okobia M.N., Bunker C.H., Okonofua F.E., Osime U. 2006: Knowledge, attitude, and practice of Nigerian women towards breast cancer: a cross-sectional study. *World J SurgOncol*.
- [3] Mufida, dkk. 2015. The Effect of Teaching Direct Instruction Model Towards The Knowledge and Skills of Health Cadres About Breast Self-Examination (BSE). *Jurnal Keperawatan*. ISSN: 2338-6371.
- [4] Andani, Yuri. 2017. Hubungan Metode Pembelajaran Praktikum terhadap Penguasaan Materi Perkuliahan pada Mahasiswa Program Sarjana Fakultas Keperawatan Universitas Sumatera Utara. *Repository Institusi USU*. Universitas Sumatera Utara. <http://repository.usu.ac.id>
- [5] Sugiono. 2010. *Metode Penelitian Kuantitatif dan Kualitatif dan R & D*. Bandung: Alfabeta.
- [6] Kyle, R & R, Murray. 2008. *Clinical Simulation: Operation, Engineering, And Managemant*. 1 st ed. Los Angeles: Elsevier Inc.
- [7] Dent, J.A Hardent, R, M 2009 *A pratical guide for medical teacher*. 3nd ed. New York: Elsevier Churchill Livingstone.
- [8] Lucian Leape Institute. *Unmet needs: teaching physicians to provide safe patient care*. Boston: National Patient Safety Foundation, 2010. [http:// www.npsf.org/wp-content/uploads/2011/10/LLI-Unmet-Needs-Report.pdf](http://www.npsf.org/wp-content/uploads/2011/10/LLI-Unmet-Needs-Report.pdf) (accessed Apr 2018).

- [9] Montagna G, et all. 2018. How To Become A *Breast Cancer* Specialist In 2018: The Point Of View Of The Second Cohort Of The Certificate Of Competence In *Breast Cancer* (CCB2). *The Breast* Vol 4. 18-21.
- [10] Budzik et all. 2019. Clinicopathological Characteristics Of Metaplastic Breast Cancer – Analysis Of The Basic Immunohistochemical Profile And Comparison With Other Invasive Breast Cancer Types. *The Breast* Vol 43. 135-141.
- [11] Wang et all. 2017. Perceived Health-Related Stigma Among Patients With Breast Cancer. *Chinese Nursing Research*. Vol 4(4). 158-161.