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A Mobile Application for Calculating Nutrition of Cervical Cancer Patient

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ABSTRACT

Nutritional balance is one of the complex problems that can occur in cervical cancer patients. This problem can lead to a decrease in the quality of life of patients during treatment, so the nutritional needs of cervical cancer patients must be controlled and maintained in order to improve the quality of life of patients. It takes a nutrient that cervical cancer patients can use to help them calculate and balance these nutritional needs. This study aimed to create an application to help cervical cancer patients manage their nutritional needs. Research and development research was carried out using the ADDIE method. A limited test of this application was carried out by involving 30 cervical cancer patients who meet the inclusion criteria, namely, cervical cancer patients who had received curative treatment in the form of chemotherapy or radiotherapy in the Cancer Information and Support Center (CISC). The average score of the System Usability Scale used in this limited test was obtained with a value of 79.90 which was in the good and acceptable category. This application can certainly be one way to help cervical cancer patients in managing nutrition and improving their quality of life.

Keyword: Application, Nutrition, Cancer, Cervix

1. Introduction

Cervical cancer can cause complex physical, psychological, social, and spiritual problems for patients. Psychologically, the patient will have a sense of fear, anxiety, and stress that stimulates catecholamine hormones. The hormones affect appetite, resulting in reduced appetite (anorexia) (Fitriana and Ambarini, 2012). Patients with cervical cancer will have several therapies or treatments, namely surgery, chemotherapy, and radiotherapy. Chemotherapy, in particular, is a cancer treatment that uses a series of drugs aimed at inhibiting the growth of cancer cells and the patient's nutrition (Caesandri and Adiningsih, 2015; Adhisty, Rizona and Hudiyati, 2021).

Patients undergoing chemotherapy often experience side effects such as nausea and vomiting, which affect their appetite (Dwi Wahyuni, Nurul Huda, 2015). Nausea and vomiting cause them difficulty eating, raising their nutritional imbalance. Although there are also patients who do chemotherapy but have no impact on their nutritional needs. Even so, prevention will be significant and still needed for the needs of the patient's body (Adawiyah, 2019; Adhisty, Rizona and Hudiyanti, 2019; Adhisty, Rizona and Hudiyati, 2021).

The effect of nausea and vomiting is also supported by preliminary studies conducted on members of the CISC (Cancer Information and Support Center) community. They explained that the first and most effect patients feel after completing chemotherapy is nausea and vomiting, which occurs around three days. It can be concluded that chemotherapy has an effect that disrupts the metabolic system, which will affect the patient's

Chemotherapy also affects the appetite of cancer patients. Patients will experience drastic weight loss, which can affect the incidence of Cachexia, an imbalance between intake and nutritional needs (Darmawan, A. R. F,. Adriani, 2019). Prevention should be done as soon as possible to avoid an imbalance of food intake in the body. The study explained that patients were given interventions that could address the problem, where the results showed that 38% of patients had poor nutritional status resulting in an imbalance in food intake (Hardiano, 2015). Interventions were provided to ensure that patients consumed 50% of staple foods, 25% of animal side dishes, 50% of vegetables and 25% of vegetables to meet their nutritional needs. Meanwhile, the average energy intake in cervical cancer patients was 65.15% compared to their needs (Ni nyoman, 2018). Interventions to meet nutritional needs are needed in the management of nutritional disorders in order to achieve the food components required by the body (Ardi, 2019).

Realizing this problem, researchers created an application using technological advances and highly developed information. Patients' limited information about their health makes researchers try to find solutions to dealing with patient problems. This program acts as a consultant to provide calculations following existing problems or circumstances. Researchers designed an application program that uses an expert system based on the above phenomena regarding nutritional needs and handling of cervical cancer patients. The features of this application align with the calculation result of nutrition and an example of applying the type and number of calories. This application allows patients to gain real-life experience in meeting nutritional needs and is a novelty of this study.

2. Method

This study used the Research and Development method in developing a method for calculating diet in cancer patients. The stages of the research and development method in this study include research and information gathering, planning (research planning), developing a preliminary form of product (initial product development), preliminary field testing (limited field test), and primary product revision (main product revision).

The development model taken in this study is the ADDIE model developed by Dick & Carry, where there are five stages of development: analysis, design, development, and implementation. At this stage, the implementation is carried out using application usability testing in this test made by J.R Lewis called the System Usability Scale (SUS). SUS has a universal questionnaire that can be used to assess a product. This questionnaire itself amounts to 10 questions. The final stage is an evaluation of all stages of development. To find out the results of this system usability scale (SUS) test, there are criteria from this system usability scale (SUS) model, including the following.

SUS	<u>Classification</u>	Criteria
Score $\geq 80,3$	A	Very good
Score 68 - 80,3	В	Good
Score 68	С	Fair
Score 51 - 68	D	Poor
Score < 51	Е	Failure

Table 1. Classification of System Usability Scale (SUS)

The criteria for the SUS method to be above> 80.3 is very good, but the lowest score is smaller < 51, resulting in a lesser value. How to calculate the SUS (System Usability Scale) method score with the formula is as follows

 $\overline{x} = \frac{\sum x}{n}$ $\overline{x} =$ Average score $\sum x =$ Total Score SUS n =Total Respondent

Limited field tests were conducted for selected samples based on purposive sampling criteria. The study sample was cervical cancer patients according to the inclusion criteria: cervical cancer patients aged 35-55 years and in a state of consciousness—sample calculation based on the minimum sample response with a

sample size of 30 respondents. Data collection was obtained in several ways; first, by collecting primary data, i.e. data obtained directly from the research subject, the subject will follow the directions from researchers to use this application in approximately 30 minutes. Second, secondary data collection was obtained from statistical data; third, with a questionnaire guide; and finally, using an application usage guide. This research confirms the ethical clearance from the medical faculty of Sriwijaya University number: 356-2021.

3. Result

The research resulted in an android-based application to calculate nutritional needs in managing nutritional problems in cervical cancer patients. The development of technology and information supports this application. Applications developed by information technology are collaborating with the world of health, especially in the field of nursing, to help cervical cancer patients and health workers overcome nutritional problems. The realization and function of the application can be seen as follows:

Application link

The researcher sends a link prepared for the application downloading process, which is sent via WhatsApp.

https://play.google.com/store/apps/details?id=com .andigitek.hns 11.36 v//

Figure 1. application link

Main page

The page that contains the main display of the application



Figure 2. Front View when App is Opened

Introduction page of nutrition and types of nutrition

This page contains an explanation of what nutrition is and what types included in nutrition are.

'edull & Cegah Kanker Serviks	
Nutrisi	Nutrisi
Nutrisi adalah suatu proses dimana tubuh menggunakan makanan untuk membentuk energi, mempertahankan kesehatan, pertumbuhan dan untuk kelangsungan fungsi organ tubuh.	Nutrisi adalah suatu proses dimana tubuh menggunakan makanan untuk membentuk energi, mempertahankan kesehatan, pertumbuhan dan untuk kelangsungan fungsi organ tubuh.
enis Nutrisi	Jenis Nutrisi
Lemak Air Vitamin	Protein Karbohidrat Lemak
<u>a</u>	Beranda (1000g

Figure.3 (a) Data filling column; (b) Sample data filling column

Data entry page for calculating daily nutritional requirements

The calculation menu page displays several columns for the user to fill in, such as name, age, weight, height, and cancer stage. After filling in the columns, the user can click Calculate (*Hitung*)

Hitung Nutrisi Masukkan data anda dengan benar	Hitung Nutrisi
Noma	Nomo
	s
Umur	Univer
	48 tohun
Berat Badian	Berat Badan
	40 kg
Tinggi Badan	Tinggi Bodon
Tinggi Badan	150 cm
Stadium Kanker	Stadium Kanker
	2
	Hitung
Hitting	

Figure 4. (a) Data Filling Column (b) Sample Data Filling Column

Calculation result page

This page will display the calculation results on the previous page, in which the results are the number of calories needed per day, the amount of protein needed per day, the amount of carbohydrates required per day, and the amount of fat needed by the body per day.

← (Hitung
Hai,	S & Cagah Kankor Servika
	Hasil Hitung Nutrisi
	Kalori : 2322 Koal
	Energi Total : 2322 Kcal
	Protein : 87 gr
	Karbohldrat : 281 gr
	Lemak : 77 gr
	stadium Kanker : 2
	Saran Makan
	Saran Kegiattan

Figure 5. Example Calculation Result

Food advice page

This page contains which food components are served

← Saran Makan		← Saran Makan		← Saran Makan		
Hai, S Pastikan Mantai dan tubuh anda kuat Sarap Makap		Hai, S Pesitikan Mentel dan tubuh ende kuat Saran Makan		Tahu	76 kcal	8 gr
Protein	~	Protein	~		8	
Karbohidrat	~	(!		Dibutu Pagi	hkan Kalori _{Slang}	Sore
Karboniarat		Dibutuhkan Kalori Pagi Siang	Sore	741 Kcal Dibutuhl	741 Kcal Kan Pergran	741 Kcal
Lemak	~	741 Kcal 741 Kcal Dibutuhkan Pergram	741 Kcal	Pagi 83 g	Slang 83 g	Sore 83 g
Vitamin	~	Pagi Siang 28 g 28 g	Sore 28 g	Sara Nasi Putih	n Makan 130 kcal	28 gr
Air	~	Saran Makan Daging Sapi Tanpa Lemak 250 kc Daging Ayam Tanpa Kulit 160 kci	al 26 gr al 25 gr	Kentang Nasi Merah Roti	76 kcal 110 kcal 264 kcal	17 gr 23 gr 49 gr
		Kacang Panjang 347 kcal Kuning Telur 321 kcal	21 gr 16 gr	Ubi Puding	85 kcal 119 kcal	20 gr 20 gr
		Tahu 76 kcal	8 gr	Lemak		~
		Karbohidrat	~	Vitamin		~

Figure 6. (a) Recommended food components (b) Protein Requirement (c) Carbohydrate Requirement

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<- s	Saran Makan			←	Saran Makan	
	Roti	264 kcal	49 gr		Pagi Siang	s
	ОБІ	85 kcal	20 gr		26 g 26 g	2
	Puding	119 keal	20 gr		Concern Markens	
					saran Makan	
Lemak	c				Minyak Kedelai	Mentega
		-		American		
	Dibutub	kan Kalori		Vite	amin	
	Pagi	Siang	Sore			
	741 Keal	741 Keal	741 Keal		Witness tes	
	Dibutuhk	an Pergran	n		Vitamin A Susu	Keju T
	Pagi	Siang	Sore		Vitamin B Daging Pisang	Apel 1
	25 g	25 g	25 g			
					Vitamin C Jeruk Stra	wberry
	Sarar	anakan	74.95		Vitamin D Salmon	Funa Ja
	Minyak Jagung	900 kcal	100 ar		Vitamin E Pepaya Kiw	d Jamb
	Minyak Kedelai	BB4 kcal	100 gr		A dia manalari be	
	Mentega	Z18 koal	81 or			вак вл
				1		
Vitami	in			Air		
					Mar	
Air					A los De stalles	

Figure. 7 (a) Fat Requirement (b)Vitamin and water Requirement

Activity suggestion page

This page displays activity suggestions for the users

← Saran Kegiatan		← Saran Kegiatan	
Hai, S Pastikan Mentel dan tubuh anda kuat Saran Keglatan		Hai, S Paultan Mental dan tubuh anda luat Saran Kegiatan	
Mengendalikan Fikiran	~	Mengendalikan Fikiran	^
Meningkatkan Spritual	~	Anda harus memegang komitmen	^
Melakukan Hobi	~	menjalani pengobatan.	
		Meningkatkan Spritual	^
		Anda dapat melakukan keglatam rohanl berdoa dan beribadah.	
		Melakukan Hobi	^
		Anda dapat mengapikasikan hobi anda, seperti menjahit, menyulam dan yang lainnya.	

Figure 8. (a) Types of activities (b) Explanation of activity suggestions

The next step is to calculate SUS. The results of the system usability scale (SUS) determine the degree of the feasibility of a product system based on effectiveness, efficiency and satisfaction in a particular context. The context of use consists of users (hardware), tasks (software) and equipment (material). The following are the calculation results to determine the extent to which the application can be developed:

No	Respodent	SUS Score
1.	Respondent 1	87,5
2.	Respondent 2	72,5
3.	Respondent 3	82,5
4.	Respondent 4	77,5
5.	Respondent 5	80
6.	Respondent 6	87,5
7.	Respondent 7	82,5
8.	Respondent 8	72,5
9.	Respondent 9	75
10.	Respondent 10	85

Table 2. Respondent's SUS (System Usability Scale) Score (According to total multiplied by 2.5)

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Respondent 11	80
Respondent 12	80
Respondent 13	72,5
Respondent 14	75
Respondent 15	80
Respondent 16	85
Respondent 17	85
Respondent 18	75
Respondent 19	77,5
Respondent 20	72,5
Respondent 21	80
Respondent 22	72,5
Respondent 23	87,5
Respondent 24	85
Respondent 25	77,5
Respondent 26	80
Respondent 27	80
Respondent 28	85
Respondent 29	87,5
Respondent 30	77,5
Total score =	2.397
	Respondent 11Respondent 12Respondent 13Respondent 13Respondent 14Respondent 15Respondent 16Respondent 17Respondent 18Respondent 19Respondent 20Respondent 21Respondent 21Respondent 23Respondent 24Respondent 25Respondent 27Respondent 28Respondent 29Respondent 30Total score =

The results of calculating the SUS score of each respondent can be seen that the highest score obtained is 87.5, and the lowest score is 72.5, while the scores that appear a lot are 80, 85, and 77.5.

The total SUS score of respondents in this study is 2,397, as shown in Table 4.5, obtained from 30 respondents. Based on this formula, the average value of the SUS score is then obtained as follows:

$$x = \frac{2.397}{30} = 79,90$$

The results of the average value obtained are then interpreted with the SUS score scale to determine the feasibility level of the cervical cancer patient nutrition application. The results of the SUS score scale are shown in Figure 9.

NPS:		Detractor							Passive				Promoter						
Acceptable:		Not Acceptable							Marginal				Acceptable						
Adjective:		Wo	orst im	agin	able			P	Poor			c	ж		Good	Exce	lient	Best	Imaginat
Grade:						F						D		С	в		A		
	L	ï	Ĩ	ï	1	Ĩ.	1	I.	Ĩ.	ì.	1	1 1		1	1	1	1	1	Ĩ.
SUS Score:	0		10		20		30		40		50	60	D	70		80	90)	100

Based on this scale, it can be interpreted that the application of nutrition for cervical cancer patients is acceptable/feasible.

4. Discussion

This dietary calculation application for cervical cancer patients is simple and effective because users do not have to worry about fulfilling their dietary needs. When users operate this application, they only need to enter the data required by the application display. Attributed to the current modern era, calculating nutritional needs and information on IT technology-based nutrition is very important. This application can ensure the accuracy of the information obtained and reduce the risk of misinformation in solving existing problems.

Researchers argue that with the development of the current era, all circles have used electronic media as a necessity and become an attraction, including among ordinary people, especially cervical cancer patients who are also familiar with smartphones (Rianto Rahadi, 2014). The resulting application is still limited to cancer only, namely cervical cancer. Previously patients have never known how to calculate their nutritional needs.

Based on the description of the calculation of the system usability scale (SUS) and interpretation, it can be seen that the prototype of nutritional applications for cervical cancer patients in handling android-based nutritional problems has significance, namely that this application is very instrumental in helping cervical cancer patients in solving the problems they experience (Nioga, Brata and Fanani, 2019). Also, this application can become a support system for cervical cancer patients.

The final result of this study found that the application of nutrition for cervical cancer patients in dealing with android-based nutritional problems dramatically affects the health level of cervical cancer patients, especially in the nutrition section (Pamungkas, Isnanto and Martono, 2016). Research that has been done before says that in meeting nutritional needs, it is necessary to manage nutritional disorders in order to achieve the nutrients needed by the patient's body. Therefore the application provided becomes a medium for managing nutritional disorders experienced by cervical cancer patients (Ardi, 2019).

A study on the fulfilment of nutrition for cervical cancer patients using Android media found that nutrition-related applications can be a place as support in dealing with nutritional problems of cervical cancer patients (Tjahjono, 2011). The feasibility of nutritional applications for cervical cancer patients in handling android-based nutritional problems is based on the research results that the application is feasible to use as one of the handlings of nutritional problems faced by cervical cancer patients. That research emphasizes that the support system, which in this study itself acts as a support system, is the application that has been provided, proving that patients who get the right support system can restore nutrition to the patient's body (Tjahjono, 2011).

Thus, after the research was conducted, cervical cancer patients who previously had nutrition problems received a solution to the problems they faced, and this solution became a necessity for them as support to solving existing problems, especially nutritional problems.

5. Conclusion and Recommendation

This research uses the development of Research and Development with five stages, where this stage reaches the revision of the 1st model, namely, the researcher revises the results of the test evaluation that has been carried out. The shortcomings in the previous stage are corrected in the revision stage. The revision stage of the application has been re-entered, and the previously revised parts have been added. This stage is tested using the SUS (System Usability Scale) method. An overview of the validation of the development of applications for the nutrition of cervical cancer patients in dealing with android-based nutrition problems, for the feasibility of applications with operational processes based on System Usability Scale testing after being tested with several respondents to get optimal results. The application aligned with the researcher's expectations and was successfully executed correctly. This means that the application is needed and helps users deal with problems.

It is expected that this Android-based cervical cancer patient nutrition calculation will be developed even better, improving the application both in terms of application menus and making the application even more complete. For future researchers, it is hoped that they can add parts to the application and operate the application on more respondents and conduct more profound research into the functions and objectives of the cervical nutrition calculation application.

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