

# *Reminder System Nursing Care with Interface Feasibility Test*

*(Case Study : PKU Muhammadiyah Yogyakarta Hospital)*

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**Abstract**—*PKU Muhammadiyah Yogyakarta Hospital is one of the hospitals that has the trust of the community to carry out medical activities in the Yogyakarta area. The hospital continues to develop and improve the quality of health services especially collaborating health with the IT world. One of the collaborations that will be done is to create a reminder application for the top 10 diseases in the Intensive Care Unit (ICU) to remind the actions of nursing care in accordance with Standard Operating Procedures (SOP), NANDA International (NANDA-I) standard, Nursing Interventions Classification (NIC) and Nursing Outcomes Classification (NOC) and some experience from nurse experts at the hospital. The method used in this study uses data collection based on facts, references, and interviews to gather information. Second step is color selection that based on color psychology to produce a suitable design. Based on the design, then an application that contains reminders based on existing diseases is built. The next process tests the application by using the black box boundary value analysis method to see the function is in accordance with its function and up to repair. In the last step, an interview was conducted using the close end question to determine the appropriateness of the application to be accepted by nurses and find out all needs of nurses in the hospital.*

**Keywords**—*reminder; nursery; nanda-i; nic; noc; psychology color; feasibility test; blackbox;*

## I. INTRODUCTION

Every part of science has a different and important role. In fact, the health sector requires the field of informatics as a supporter in carrying out activities. We need to know that the health sector needs electronic archiving in Electronic Medical Record (EMR), helps diagnosis in analyzing digital images, and many others.

The health sector has many categories such as medicine, pharmacy, laboratories, nursing and many things. This time the research conducted will be discussed about nursing in the health sector. Nursing in the medical field has a very important role in providing health services because nurses will 24/7 monitor the progress of patients. In practice, nurses with various health elements who work together to do their work produce maximum healing for patients from secondary and primary care in hospitals [1]. So that more attention must be paid to the role nurses in the world of health. As a figure who plays a role in maintaining the quality and safety of patients, nurses in professionalism are the biggest obstacle to their professional role. In addition, the need

for autonomous and fast decision making so that patients can get the best treatment [2]. The ordered and recorded knowledge base of the nurse's actions will make the emergence of actions taken by nurses to the patient both the actions that have been believed and new actions based on the education and experience of the nurses to bring new treatment innovations [3]. Infrastructure support and the level of nurse discipline also affect the success of patients in the treatment process. So, it is necessary to consider and familiarize the factors of discipline in the nurse [4]. Nurses have many jobs as responsibilities and important. One form of reminder model that is done and is quite helpful is to use posters on the hospital wall. [5]. Not far, all nurse actions must be documented in accordance with Indonesian regulatory legislation [6]. The impact is related to the bonus given to the performance of nurses as intensive for the performance achievement of nurses [7].

The research that will be achieved to make a system that helps nurses in Pembina Kesejahteraan Umat (PKU) Muhammadiyah Yogyakarta hospital in recording all the actions has taken on patients, especially the care of patients which in need of attention in the Intensive Care Unit (ICU) to be organized, scheduled and details are needed proper recording of medical records for all actions taken in monitoring using tablet PC and computer. Starting from giving medicine, bathing patients, replace infusions, bandages, and the smallest action will affect the patient's health. In addition, a system is needed to assist in documenting these actions in a format in the form of a medical record by nursing. So that all actions taken by the nurse can be mild and help nurses get remuneration after doing their work and duties based on Standard Operating Procedures (SOP).

## II. METHODS

This section explains in detail about the research conducted which is from prototype process model [8] and modified.

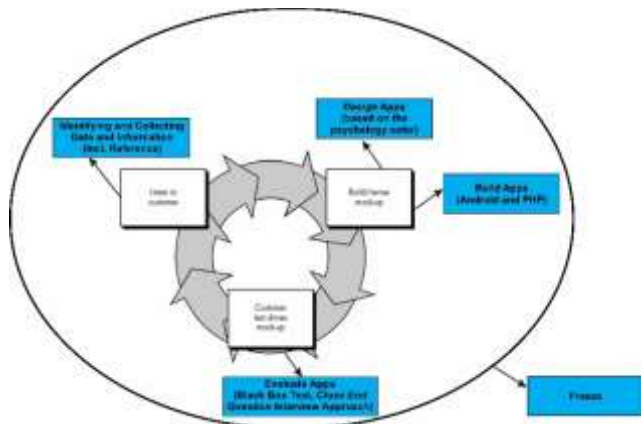


Figure 1. Process of Research

The Figure 1 explains that to implement an application, it is necessary to do several things.

A. Identifying and Collecting Data and Information

This stage aims to collect information which the application needs, the application process, the data model of application, influences, and impacts that will be raised through observation studies, literature and interviews with experts.

B. Design Apps

The model for building applications will be explained by the diagrams and psychology color of model

1. Flowchart

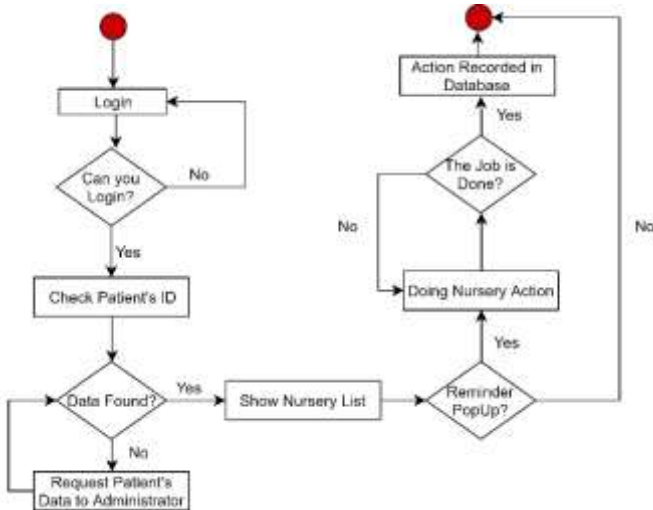


Figure 2. Flowchart System

The flowchart explains the flow of the user starting to operate the application until the operation process completes to remind the action of nursing care application.

2. Use Case

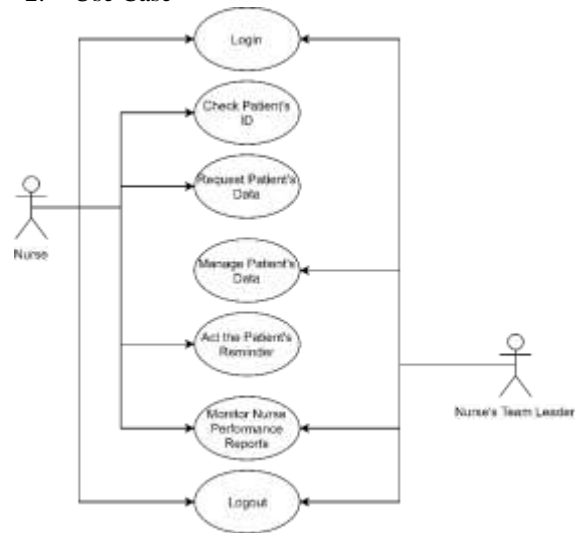


Figure 3. Use Case System

The use case image describes the role of the nurse and nurse team leader in the application. All allowed and restricted actions are described in the picture. Nurse actors are more related to predetermined actions. The nurse team leader is responsible for monitoring and managing action data in accordance with the procedure and SOP.

3. Database Relation

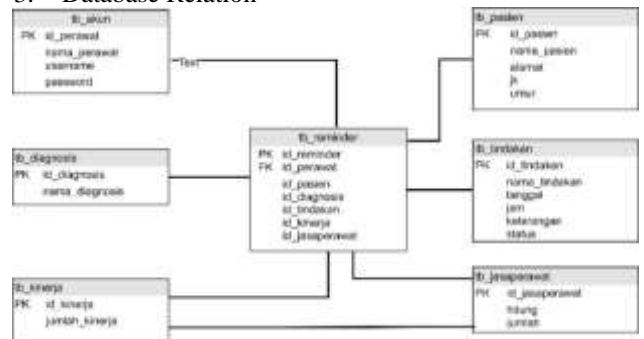


Figure 4. Database Relation Model

Figure 4 explains the flow of the data table in the system. Each table has PK (Primary Key) to define tuple values in a table and there is one main table that unites all tables with attributes that are used to create relations between two tables or more with Foreign Key (FK).

4. Color Variant by Psychology color

Design is needed to determine the appropriate appearance, especially color selection based on the user psychology [9].

III. RESULTS

TABLE I. TABLE COLOR PSYCHOLOGY

|                   | <i>Split complementary</i>         | <i>Triadic</i>                          | <i>Tetradic</i>                                 |
|-------------------|------------------------------------|---|---|
| <i>Color</i>      | combination of yellow, blue, green | combination of yellow, green and purple | combination of red, yellow, green, and purple   |
| <i>Plus</i>       | fast, cheerful, fun, calm          | fast, cheerful, calm, active            | dignified, fast, cheerful, fun, calm, active    |
| <i>Minus</i>      | cold, melancholy, restless         | calm, vulnerable, anxious               | melancholy, restless, calm, vulnerable, anxious |
| <i>Impression</i> | cheerful, beliefs, compassion      | cheerful, compassion, chastity          | strength, cheerful, compassion, holiness        |

The black background color on the design is chosen to reduce radiation which makes the eyes tired quickly

C. Build Apps

After the fulfillment of the needs has been completed, the application will be made as planned. The application will be built based on the needs of nurses by using the Android web viewer as a tool in the operation of reminders of nursing care actions.

D. Evaluate Apps

This section serves to assess the application has been implemented as planned and when there is an error will be corrected. The steps will be taken by using the black box method as a system evaluation and close end question as a system acceptance by the user.

Close end question is a measurement model to determine usability levels with the parameters of Learnability, Efficiency, Memorability, Errors, and Satisfaction [10].

Black Box Testing focuses on functional to find the following functions that are incorrect or non-existent, Interface errors, Errors in data structures and database access, Performance errors, Initialization and termination errors [11]

E. Freeze

This stage is the last stage, when the application has no errors and has run according to its function.

A. Data and Information

Based on the research, there were top 10 of diseases for 3 years in PKU Muhammadiyah Yogyakarta Hospital, including:

1. Injury to the head
2. Cardiogenic shock
3. Hypovolemic shock
4. Septic shock
5. ARDS (Adult Respiratory Distress Syndrome)
6. AKI (Acute Kidney Injury)
7. ARF (Acute Renal Failure)
8. Intoxication
9. KAD (Ketoacidosis Diabetic)
10. Breath failure by major surgery.

After obtaining disease data, the actions will then be determined based on the time and conditions of the reminder and the stage of the selection of nurse actions is **already authorized nurse of PKU Muhammadiyah Hospital to validate every step** accordance with NANDA International (NANDA-I) standard, Nursing Interventions Classification (NIC) and Nursing Outcomes Classification (NOC) in Indonesian [12] [13] [14] .

TABLE II. TABLE OF DISEASE REMINDER MODEL

| Reminder of Injury to the head            |   |  |
|---|---|--|
| Time 24h                                  | Reminder  | Information  |
| Step 1                                    | Check the patient's physical condition          | Monitor size, symmetry, reaction and shape of the pupil, level of client awareness, vital signs                |
| Step 2                                    | Install Restrain                                | (if needed)  |
| Step 3                                    | Monitor of temperature and number of leukocytes | Normal leukocyte counts differ by age between 3,500-10,500 / microliter  |
| Step 4                                    | Monitor of Oxygen Flow                          | Monitor oxygen flow, oxygen cannula and humidifier (if needed).  |
| Step 5                                    | Monitor of Head Position                        | Give a position with an elevation head of 30 <sup>o</sup> -40 <sup>o</sup> with the neck in a neutral position |
| Step 6                                    | Monitor of pain                                 | Monitor complaints of headache, nausea, and vomiting   |
| Every 2 hours                             | Check Routinely by 2 Hours                      | Monitor the physical condition, blood pressure, temperature, heart rate and sleep position of the patient.     |
| 06.00, 08.00, 10.00, 12.00, 14.00, 18.00, | Time to give antibiotics/medicine               | Antibiotics or meds given based on the severity and  |

|                               |   |  |
|-------------------------------|---|--|
| 20.00, 22.00.<br>24.00        |   | consideration of the nurse   |
| Every 30 mins before medicine | MLP ( <i>Makanan Lewat Pipa</i> )/ Feeding Pipe | MLP 1 : 1.500 calories<br>MLP 2 : 1.700 calories<br>MLP 3 : 2.200 calories |
| End                           | Monitor intake and output                       | Every day after all treatment  |

The table is 1 of 10 diseases in the ICU. Every disease has a difference in handling. The time column contains the order that must be done. Reminder column is a type of action that must be given to patients. The information column is a description of the action as a reference. The three columns that determine the appearance when pop up reminder in application.

**B. Model App**

Following are examples of applications from design.



Figure 5. Three of Main App Models

Figure 5. Three of Main App Models are the initial appearance of the application and applied by color design selection based on color psychology. *Siap* is a button which is nurse/user ready to run the application.

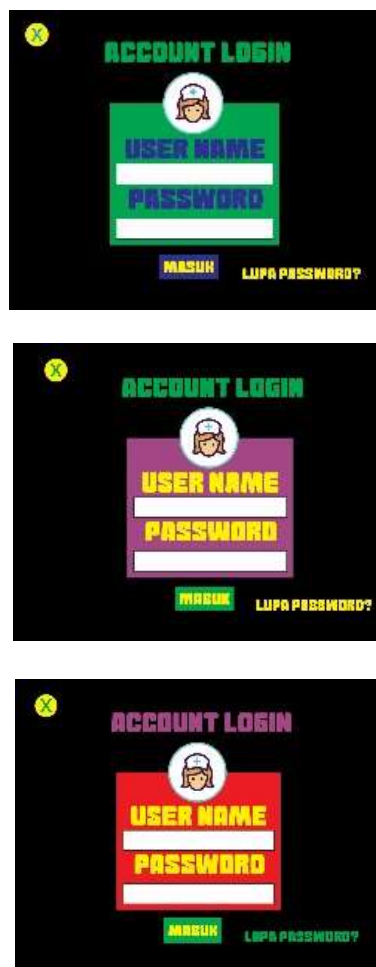


Figure 6. Three of Login Models

Figure 6. Three of Login Models are the second layer appearance of the application after succeed and applied by color design selection based on color psychology. User have to enter the correct username and password form then press *masuk* button to continue it.





Figure 7. Three of Main Menu Models

Figure 7. Three of *Menu Utama* are the third layer appearance of the application after succeed to login and applied by color design selection based on color psychology. User have to choose from 3 available menus. *Daftar Pengingat Menu* is a menu that display patient action data that must be performed. *Grafik Kinerja Menu* serves to display the performance of nurses based on the number of nurses actions in weeks and months by point performance. *Pengelola Akun Menu* is a menu for managing accounts, especially for password changes.



Figure 8. Three of Daftar Pengingat Models

Figure 8. Three of *Daftar Pengingat Menu* are the third menu appearance of the application when user have chosen the Daftar Pengingat and applied by color design selection based on color psychology. User have to fill *masukkan id pasien*/enter the patient ID number and press *Cari*/Search to find patient data. When the ID number is correct, it will be displayed for the patient nursery lists along with the day, date and *waktu*/time.

C. Blackbox Test

In the design of the application to be made there are 7 layers to be tested.

TABLE III. TABLE LAYER MAIN APPS

| Sample Data | Expected Result | Result | Conclusion |
|-------------|-----------------|--------|------------|
| Siap        | T               | T      | Success    |

TABLE IV. TABLE LAYER OF LOGIN

| Sample Data   | Expected Result | Result | Conclusion |
|---------------|-----------------|--------|------------|
| Username      | T               | T      | Success    |
| Password      | T               | T      | Success    |
| OK            | T               | T      | Success    |
| Lupa Password | F               | T      | Failed     |
| Exit          | T               | T      | Success    |

TABLE V. TABLE LAYER OF MAIN MENU

| Sample Data    | Expected Result | Result | Conclusion |
|----------------|-----------------|--------|------------|
| Date           | T               | T      | Success    |
| Menu Pengingat | T               | T      | Success    |
| Menu Kinerja   | T               | T      | Success    |
| Menu Akun      | F               | T      | Failed     |
| Exit           | T               | T      | Success    |

TABLE VI. TABLE LAYER OF REMINDER MENU

| Sample Data    | Expected Result | Result | Conclusion |
|----------------|-----------------|--------|------------|
| Cari ID        | T               | T      | Success    |
| Cari Pengingat | T               | T      | Success    |
| List Pengingat | T               | T      | Success    |
| Tanggal        | T               | T      | Success    |
| Waktu          | T               | T      | Success    |
| Exit           | F               | F      | Success    |

TABLE VII. TABLE LAYER OF REMINDER

| Sample Data | Expected Result | Result | Conclusion |
|-------------|-----------------|--------|------------|
| OK          | T               | T      | Success    |
| Skip        | F               | F      | Success    |

TABLE VIII. TABLE LAYER OF WORK GRAPHIC

| Sample Data | Expected Result | Result | Conclusion |
|-------------|-----------------|--------|------------|
| Month       | T               | T      | Success    |
| Week        | T               | T      | Success    |
| Score       | T               | T      | Success    |
| Graphic     | F               | T      | Failed     |
| Exit        | T               | T      | Success    |

TABLE IX. TABLE LAYER OF PASSWORD

| Sample Data    | Expected Result | Result | Conclusion |
|----------------|-----------------|--------|------------|
| Old Password   | T               | T      | Success    |
| New Password   | T               | T      | Success    |
| Repeat New Pwd | T               | T      | Success    |
| Change         | F               | F      | Success    |
| Exit           | T               | T      | Success    |

D. Close End Question

Results based on existing references produce several designs for the application. Evaluation based on close end question generate questions.

TABLE X. TABLE CLOSE END QUESTION PARAMETER

| No | Component    | Question   |
|----|--------------|--|
| 1. | Learnability | Explain the level of ease in operating the app.  |
| 2. | Efficiency   | The user explains the difference in the user's speed level in completing tasks using and without using the app.                |
| 3. | Memorability | Explain the level of convenience after a while not using the app.  |
| 4. | Errors       | Explain the number of errors made by the user the level of boredom with errors and how to correct errors in operating the app. |
| 5. | Satisfaction | Explain the level of user satisfaction with the app.   |

IV. DISCUSSION

The results of interviews with the nurses has accommodated variables in the close end question, nurses think it will be helped by the reminder application. But, the influence of the color design selection does not significantly affect the work The remuneration process also helps in giving bonuses to nurses. Documentation also helps when remembering nurse's actions written in Activity Daily Living (ADL). However, the problem arises when nurses have difficulty carrying tablet PCs at all the times. Then, the recommended solution by the nurse is to display the nursery action in the big screen (TV monitor) as an

output so that it is easily monitored which is connected with HDMI or wi-fi with tablet PC.

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