

# The Development of Information Systems in Documentation Management of Critical Care Nursing

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## ABSTRACT

Intensive Care Unit (ICU) is one of the units in the hospital that clients receive intensive medical care and monitoring. There, nurses carry out the nursing care process. All steps in the process must be properly documented. Although nursing care documentation is very important for both patients and nurses, but in reality there are still many incomplete nursing care documentations. The nurses' awareness to completely fill the documents is still lack. Currently, many technological developments have been developed to support activities/work in various fields. one of them is the development of health information system, a nursing management system. So, this research aims to produce a product in the form of ICU nursing care documentation software that enable nurses in documenting their nursing care easier and well documented. The method used at this research is a product-oriented development model. The stages are: 1). Initiation System (initiation of the system), 2). Analysis System, 3). Design System and 4). Production that then tested through the prototype Black Box Testing. The research result shows that this software very useful because it shortens the time for preparing reports. Even this study uses students as research objects, nurses who work in the hospital also can use this software.

**Keywords:** *Nursing, technology, information, documentation, critical care.*

## 1. INTRODUCTION

The Intensive Care Unit (ICU) is one of the units in the hospital that clients receive intensive medical care and monitoring. ICU has advanced technology such as computerized heart monitors and mechanical ventilators. Both are also available in a normal care unit, but clients in ICU are monitored and maintained using more than one equipment. The nursing and medical staff at the ICU have specialized knowledge of critical car principles and techniques. ICU is the most expensive medical service place because a nurse only serves one or two clients at a time and because a client in the ICU needs many therapies and procedures [1].

In the ICU, nurses carry out the nursing care process. The steps are assessment, making nursing diagnoses, planning nursing actions, implementing nursing actions and evaluating nursing actions. All the steps must be systematically, and continuously until they achieve the

treatment goal. All steps of the nursing process must be properly documented. If the nursing care can be implemented properly, the care quality for patients will be good [1]

Nurses have an important role that contributes greatly to improve the quality of hospital services. One of efforts to improve quality is that a nurse must be able to carry out nursing care based on standards, from assessment to evaluation along with those documentation. Patient care documentation is important and fundamental and nurses use it to communicate the health status of the patient's needs and their readiness to care [2].

Supporting nursing documentation reflects the continuing ability of nurses to think critically about the development of their patient care plans to produce optimal patient health levels. Nursing documentation has a large proportion of the patient's clinical development journey to inform the situation that occurred during care. It is also a medium for interprofessional coordination

(Interdisciplinary) which can be used to reveal an actual fact to be accounted for [3].

Although nursing care documentation is very much needed for the benefit of both patients and nurses, in reality the equipment for filling out the documents is hardly to find. There are still many incomplete nursing care documentations found. This incompleteness is influenced by many factors, one of which is workload. It is because nurses think that documentation is a burden for them. The various impacts are communication dysfunction and many errors in communication, action planning, taking action and others that can decrease quality of nursing care and lack of accountability evidence for nurses if unexpected things happen such as disability, poor management in a ward or room and even death [4].

Currently, any technological developments have been developed to support activities/work in various fields. one of them is the development of health information system, a nursing management system. Expert System is one of the fields of Artificial Intelligence. It is one of the development of an information system that functions to replace the knowledge base of an expert to provide solutions to existing facts. Many researchers have developed and researched its applications a lot especially in the diseases diagnosis which are based on medical diagnosis. Based on the fact above, it is very important to develop a software as an effort to facilitate ICU nurses in documenting their nursing care. Hopefully, the results of this study can be useful for them in the process of documenting nursing care.

## 2. METHODS

The researchers use is Microsoft Access 2010 [5], the development of information systems. The procedures adapts the ADDIE development model. In this case, the researchers take three ADDIE stages, namely Analysis, Design, and Development. At Analysis stage, the researcher analyzed the material about nursing documentation, both in terms of what in the nursing documentation are and how to prepare nursing documentation. Based on the results of the analysis, researchers find out what will be applied. Furthermore, at Design stage, the researchers make an application design in accordance with what researchers have previously analyzed. The last stage is Development stage that researchers test and develop applications that have been previously made [6].

## 3. RESULTS

The researchers make design system that includes designing of actors determination, designing use cases, designing use case scenarios or also known as use case narratives, and activity diagrams.

### 3.1. Actors Determination

The actors involved in this system as users are Nursing. Users can create nursing documentation in critical care documentation application.

### 3.2. Designing Use Case

In designing use case, the researchers do four things: tell what the system will do; determine what the system will do; describe expected function of the system and describe the system requirements from the user's point of view. In the prototype of this study. the researchers make five systems: storage system, refresh system, print system, delete system, and search system. Storage system this system will

store the data that has been filled in by the user. Refresh system will empty the completed form data. print system will print the form that filled out by the user. Delete system will delete the patient data as the user desired. Meanwhile, in search system, the user can search for the desired data.

### 3.3. Designing Use Case Scenario

Use case scenarios are a set of interaction scenarios that are textually described. Each scenario describes a sequence of actions or steps taken by actors when interacting with the system, whether it succeeds or fails. Important parts in a use case scenario are:

- Use case name, described use casename.
- Actor, namely users who run the system
- Descriptions, namely descriptions of use cases
- Trigger, which is the purpose of the use case
- Preconditions, namely the requirements for the use case to start
  - Basic flow, namely the activities that will be carried out by the use case
  - Postcondition, namely activities after the use case has been completed

#### 3.3.1. Save use case

The used name in the use case save is "Save". Users who will use this prototype are nursing students of Universitas Jambi. A brief description will describe this use case to store filled patient data. The precondition that must be done firstly by the users is that the users have opened the application and have filled in the patient data. For the trigger in this use case, every users who want to store data must have filled in patient data first. The basic flow in this use case involves the user actor action by clicking the save

button and the data response system can be stored. For postcondition the user can save data into the system.

### *3.3.2. Refresh use case*

In the use case refresh, the used name is "Refresh". Users who will use this prototype are nursing students of Universitas Jambi. A brief description that can describe this use case is that this use case is used to return a form that has been filled in empty as before. The precondition that must be done first by the user is that the users have filled in the patient data and have stored the data if they want to fill in the data again. For the trigger in this use case, every user who wants to return the form to blank must have filled in the patient data first. The basic flow in this use case involves the user actor action clicking the refresh button and the system response form will be blank as before. For postcondition the user can fill back new patient data.

### *3.3.3. Print use case*

In the use case refresh, the name used is "Print". Users who will use this prototype are nursing students of Universitas Jambi. A brief description that can describe this use case is that this use case is used to print data that has been filled in. The precondition that must be done first by the user is that the users have filled in the patient data and have stored the data if they want to print the form that has been filled. For the trigger in this use case, every user who wants to print the form must first fill in the patient data. The basic flow in this use case involves an actor action user clicking the print button and the form response system will bring up the print settings. For postcondition, the user can print the completed form.

### *3.3.4. Delete use case*

In the use case refresh the name used is "Delete". Users who will use this prototype are nursing students of Jambi University. A brief description that can describe this use case is that this use case is used to delete stored data. The precondition that must be done first by the user is that the user has filled in the patient data and has stored the data. Then want to delete the data that has been stored. For the trigger in this use case, every user who wants to delete must have filled in patient data first. Basic flow in this use case involves the user actor action, clicking the delete button and the system response, the system will delete the data and data in the tables will be lost. For postcondition the user can delete the data that has been filled in.

### *3.3.5. Search Use case*

In the use case refresh, the name used is "Search". Users who will use this prototype are nursing students of Jambi University. A brief description that can describe this use case is that is used to search for stored data. The precondition that must be done first by the user is that the user has filled in the patient data and has stored the data. Then want to find the data that has been stored. For the trigger in this use case, every user who wants to search must have filled in the patient data first. The basic flow in this use case involves the user actor action, clicking the search button and the response system, the system will bring up the search option. For postcondition the user can search for stored data.

## **3.4. Activity diagram**

### *3.4.1. Save activity diagram*

Save activity diagram describes the sequence of activities that must be carried out by users who want to store data in the database. The steps are opening the application and filling out the patient form. Then, the users can click save and the data is stored in the database.

### *3.4.2. Refresh activity diagram*

In this refresh activity diagram, it explains the sequence of activities that a user must do to fill in new patient data. The steps that must be taken are the form has been filled in, click refresh, and the form will return to its original state.

### *3.4.3. Print activity diagram explains the*

sequence of activities that a user must do print patient data. The steps are open filled form, click print, print setting will occur, set as the need, then click OK.

### *3.4.4. Delete activity diagram*

In the delete activity diagram, it explains the sequence of activities that a user must do to permanently delete patient data. The steps that must be taken are the form has been filled in, click delete, the data will be deleted from the database.

### *3.4.5. Search activity diagram*

It explains the sequence of activities that users who want to search for patient data must do. The steps that must be taken are that the form has been stored in the database, click search, find settings will appear, type the keywords you want to search, and click find next.

### 3.5 Database design

In this database, data involved in the process that occur are defined and collected in the following form:

NO.	Field	Type
1.	Nomor Rm	Number
2.	Name	Text
3.	Age	Number
4.	Gender	Look up wizard
5.	Address	Text
6.	Enter date	Date/time
7.	Hour	Number
8.	Respons	Look up wizard
9.	Tekanan darah	Text
10.	Suhu	Number
11.	Nadi	Text
12.	Masalah airway	Look up wizard
13.	Data objektif airway	Look up wizard
14.	Data subjektif airway	Look up wizard
15.	Diagnosa keperawatan airway	Look up wizard
16.	Intervensi airway	Text
17.	Evaluasi airway	Text
18.	Masalah breathing	Look up wizard
19.	Data objektif breathing	Look up wizard
20.	Data subjektif breathing	Look up wizard
21.	Diagnosa keperawatan breathing	Look up wizard
22.	Intervensi breathing	Text
23.	Evaluasi breathing	Text
24.	Masalah circulation	Look up wizard
25.	Data objektif circulation 1	Look up wizard
26.	Data subjektif circulation 1	Look up wizard
27.	Diagnosa keperawatan circulation 1	Look up wizard
28.	Intervensi circulation 1	Text
29.	Evaluasi circulation 1	Text
30.	Data objektif circulation 2	Look up wizard
31.	Data subjektif circulation 2	Look up wizard
32.	Diagnosa keperawatan circulation 2	Look up wizard
33.	Intervensi circulation 2	Text
34.	Evaluasi circulation 2	Text
35.	Data objektif circulation 3	Look up wizard
36.	Data subjektif circulation 3	Look up wizard
37.	Diagnosa keperawatan circulation 3	Look up wizard
38.	Intervensi circulation 3	Text
39.	Evaluasi circulation 3	Text

### 3.6. System Evaluation

At this stage, to get perfect application results the researcher do evaluation of the prototype. Furthermore, the prototype will be developed into a complete application. Either developed by the researchers themselves or developed by other researchers.

## 4. DISCUSSION

Testing the prototype using the Black Box method shows that the five buttons on this prototype can be used properly. In the save button, the expected results by the researcher when the user presses the save button are that

the data can be stored in the database and can be viewed in tables. After testing by pressing the save button the data can be stored in the database and can be viewed in tables. On the refresh button, the expected results is when the user presses the refresh button are that the user can return the blank form to the original. After testing by pressing the refresh button, the form on the prototype is empty again and the user can fill in the patient data again.

On the print button, the expected results by the researcher when the user presses the print button are that the user can print the desired data. After testing by pressing the print button, the print setting will appear. In

the print settings section, the user can choose which printer to use, which part to print, how much to print, and so on. After that, you can press the print button and the results can be printed.

On the delete button, the expected results when the user presses the delete button are that the user can delete the data that he wants to delete. After testing by pressing the delete button, the patient data will be lost in the database, the data cannot be seen in the tables. In the search button, the expected results if the user presses the search button are that the user can search for the data that he wants to search. After testing by pressing the search button, a find setting will appear, here the user just needs to type what data he is looking for then press the find next button, from the results of pressing find next the data being searched for can be found.

## 5. CONCLUSIONS

The results of this research is an application to assist critical care nursing in making nursing care reports. The application is still limited. However, from the results of trials using the application, the average time for preparing a nursing care report faster than the manual method.

## ADVICE

Further developments are adding the list of diseases in the database for wider coverage, searching function based on diagnosis and searching information in the form of images

## AUTHORS' CONTRIBUTIONS

LPPM Jambi University

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