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Conference Paper

Nursing Informatics System in Health Care Delivery

Candra Saputra[1] and Yulastri Arif[2]

[1]Department of Community Health Nursing, Nursing Program, STIKes Payung Negeri Pekanbaru, Indonesia
[2]Department of Nursing Management, Magister of Nursing Program, Andalas University, Indonesia

Abstract

Background: The use of information technology in nursing care services is very important. The development of nursing information systems is oriented towards improving the quality of nursing care. **Objective:** This paper aims to present a complex understanding of nursing information systems and relates them to the terminology of nursing care that can be used in health services. Nursing information systems in health services consist of clinical settings and community settings. **Method:** This paper presented with a method of literature study through searching database in SCIENCE DIRECT and ELSEVIER of scientific journal. We searched by identifying relevant journals. This Paper presents 39 journals from 2011 - 2016. **Results:** Nursing Information System is a combination of nursing, information, and computer science to manage and process data into knowledge to use in nursing practice. We introduce a nursing information design system using NNN Linkage terminology. Nursing Information System consists of standards of nursing care, standard operating procedures, calculation of nurse credit values, list of nursing diagnosis, list of nursing interventions, implementation reports, statistical reports, and nursing care resumes. **Conclusion:** The use of information systems in nursing care services provides an overview of knowledge and innovation in the use of information technology in providing nursing care services.

Keywords: Nursing Informatics, Health Care, NNN Linkage

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1. Introduction

The utilization of information and technology in the practice of nursing cara is very big. Health information system is utilized through the combination of devices and procedures used to manage the information cycle. One of health information system development is nursing care management system [1]. The benefit of the development can increase the nurse ability in organizing nursing care management [2]. Beside that, it can also increase complete data report and communication system and clear delegation. Until the efforts are necessary to develop nursing informatics system technology.

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Page 38

The development of nursing information system oriented on the enhancement of documentation quality of nursing care. According to Darvish, et al (2014),, nurses have opportunities to utilize nursing information system in increasing documentation quality of nursing care. The research in Iran and Europe mentions that the usage of computerization system can improve documentation quality of nursing care [4], [5]. Nurses must be able to notice the type and form of nursing information technology. Until in organizing nursing care documentation, the nurse implements it by using the model and form of nursing information system by using some terminologies.

The terminology of nursing care process which is always exposed is by using NANDA, NIC, and NOC. In The United States of America, Europe, and Africa, the utilization of NNN terminology has been conducted thoroughly. In The United States of America, 72% has applied NANDA-I Diagnosis and in Negeria 73,3% has used terminology NNN [6], [7], [8]. According to R. Hariyati R. Hariyati, (2011), in Indonesia most of nursing practice also have implemented NNN terminology. In line with the usage of that terminology, it is frequently integrated in the form of electronical basis documentation. The effort done is by developing nursing information system application.

The model of nursing information system nowadays has developed a lot. In Europe, there is development of NMDS-AT and in Brazil, there is development of PROCEnf-USP model [8], [10]. In Indonesia, R. Hariyati et al., (2016), has introduced SIMPRO model as a form of nursing documentation information system. The research shows SIMPRO model efficient in improving FTE until 24%. However that development still at Clinic Hospital level only. Until it is necessary to develop nursing information system at Society Health Center (Puskesmas).

The main challenge is conducting change in the form of paper based documentation to computerization based documentation. That effort becomes the focus to be able to develop an information system by putting forward nursing care standard existed at the primary service in accordance with the job description of a nurse. Of cource, if that problem can be achieved, the development of integrated nursing information system is a main strategy in enabling the nurse in performing nursing care documentation.

2. Methods

The method used in this research was literature study. This study was conducted by identifying and finding journals on the database in SCIENSE DIRECT and ELSEVIER. This study was conducted by identifying the relevant journals with suitable topic and terminology with the list in Table 1 below.

TABLE 1: Searching Terminology.

Focus	Point of View	Setting
Nursing Information System	Definition	Primary Health Care
Health Information System	Nursing process	Community Health Care
Electronic health record	Terminology	Family
Nursing terminology	NNN Linkage	
Telemedicine	Data base management	
Nursing process	Nursing information technology	
	Informatics design	
	User centered patient	
	Assessment	
	Nursing problem	
	Nursing plan	
	Nursing implementation	
	Nursing evaluation	
	Nursing documentation	

3. Results and Discussion

3.1. The concept of nursing information system

Nursing information system is part of health information system which beforehand known as medical informatics [12]. Nursing informatics is science and practice integrated with nursing, information, and its knowledge, family, and the society [13]. The term "Nursing Information System", is combining nursing, information, and computer science to process and manage data to be knowledge to use it in nursing practice. The definition of nursing informatics has developed and has been perfected. American Nurses Association (ANA) states that the difinition is as; "special which integrates nursing science, computer science, and the science to manage information and our data communication, information, knowledge, and wisdom in nursing practice." [14].

Nursing information system needs transformation from health information system. This included the change towards health information technology (TI) to improve the quality, security, and health service efficiency. This transformation covers communication improvement such as the provider and the patients, automating clinical information, decreasing errors, and promoting evidence based practice. Some components of information system in general are as follows:

1. Nursing Information System (SIK) supporting taking patient's decision, nurses, and other providers in all roles and setting. This assistance can be achieved through the utilization of information structure, process, and technology.

2. The competence of Nursing Information System (SIK) users employed in largely clinical practice, considered expert in using the nursing process, and have additional experience and education in technology (Health Information and Society System Management) [14].

3.2. The program in nursing information system

The programs designed in nursing information system are as follows:

1. Nursing Care Standard by using International Standard by referring to Nursing Diagnosis issued by North American Nursing Diagnosis Association, Nursing Outcome Standard referring to Nursing Outcome Clasification and nursing intervention standard referring to Nursing Intervention Classification (NIC) issued by Iowa Outcomes Project. This nursing Care Standard also has ben equipped with nursing study standard by referring to 13 Nursing Diagnosis Division arranged by Doenges and Moorhouse and nursing evaluation standard by referring to the criteria in Nursing Outcome Classification (NOC) with scoring model.

2. Standard Operating Procedure (SOP) is the explanation about nursing action standard obtained in nursing care standard. SOP is the detail activities from NIC.

3. The calculation of nursing credit number. The problem that mostly complained by nurses is making credit number because of different perception between Staff Affairs and Nursing labors. Beside that, the nurses' chance in calculating the credit number is very few. Until the calculation of credit number mostly delayed and invalid. The system made in Nursing SIM, the credit number is a recapitulation from nurses' daily activities, which automatically will be able to be accessed daily, weekly, or monthly.

4. The list of the most nursing diagnosis. The list of nursing diagosis is recapitulated by the system based on daily nursing input. The calculation of nursing diagnosis is beneficial for making nursing care standard.

5. The list of the most NIC is the recapitulation of the most nursing action based on each existing nursing diagnosis.

6. The implementation report is the recapitulation of nursing actions in one period, which can be filtered based on space, practitioner, and patients. This report can be effective monitoring tools about learning needs for the nurses. The implementation report also can become shift change assistance.

7. Statistics report which is emerged in nursing management information system is the report in the form of BOR, LOS, TOI, and BTO in that space.

8. The nursing resume in the end period of inpatients' nursing, the nursing resume must be attached in the medical record. The nursing resume is beneficial for viewing globally patient management when thay are treated beforehand, if patients were ever nursed in the hospital. In the system, nursing resume is printed when patients are about to check out from the nursing. The computer has recorded the necessary data for making the nursing resume.

9. The List of ideal SAK (Nursing Care Standard) is based on evidence based nursing, which is the result of research from the application of existing nursing care standard. However, because the documents were incomplete, SKA mostly adopted only from the available literatures. Inthe system of nursing management information, SKA based on the recapitulation from the system that has been made.

10. Acknowledging The System of Nursing Services integrated with SIM RS, this enables the nurses to know the service of actions that they do [9].

3.3. The development by using NANDA, NIC, and NOC terminology

The standardization of terminology used in the application of nursing information system uses classification system standard NANDA diagnosis, NOC outcomes, and NIC intervention. The usage of NNN terminology will improve more documentation quality in nursing care by using informatics technology and the process of problem solving will be more focus [15]. The language of basic system language is Java Language. Therefore, to access DBMS (Database Management System), JDBC (Java Database Connectivity) which is offered by Microsoft is used. And also, the storage, searching, modification, and deleting data are done by using DAO (Database Access Object). The Data in the system are produced and conveyed in the pattern of Java class, and this is nominated only as 'Bean'. Beside that, this system is done based on Service Oriented Architecture (SOA), which assembles the service defined in accordance with the needs of business and realize the function desired, not like the existing development method [16].

The nursing process is a part of nursing profession and the usage of computer and digital devices that can improve the efficiency and effectivity of the nursing process. This can help fulfilling the nursing practice standards and help to spare more time to fulfill the needs of the patients [17].

TABLE 2: The Utilization of Information System in Nursing Care [17].

The Nursing Process	The Usage of Nursing Information System
The Assessment	Use the computer to note the acceptance information. When the nurse collects the data, input further information like asked by the computer software program. Input the data about the patients' health status, history, and main complain, and other assessment.
Nursing Diagnosis	Most database nowadays input the diagnosis standard with related sign and symptom as references. After the nurse used their clinical assessment to determing the nursing diagnosis for each patient, then the information related to the diagnosis can be obtained quickly.
Planning	To help starting writing the nursing plan, the computer program is first displaying the suggested intervention for the diagnosis and the expected results.
Implementation	Use the computer to note the intervention and patients' information, such as the transfer instruction and the release, and to communicate this information to other departments.
Evaluation	During the evaluation, use the computer to note and save the observation, patients' responses towards the nursing intervention, and the statement of nurses' evaluation itself. If the patients' result desired not achieved yet, jot the new intervention conducted to ensure the desired results.

A structured analysis method is applied to design the software-based web. This method consists of graphics system arrangement, context diagram, data flow diagram, flowing E-R diagram, program structure, data dictionary, and process specification (PSPEC). Graphical User Interface (GUI) and the right menu application are design to ease users in using the application. The program structure is made to describe the whole process depending on the system and the process of nursing care implementation available in the society service. This is frequently considered as the control hierarchy. The structure of re-writing program all the process in the data flow diagram available focuses on the Program of The Society Health Center structure with web-based.

The system of database management design is collected and identified, then categorized into table of data. This is categorized in accordance with the rules normalization. The logical technique to design a database software. This enables us to create the structure of good relationship without any redundancy.

The nurse gives nursing service through nursing care efforts. The nursing care is aimed to individuals, families, group, and society with the usage on nursing process approach, starting from the assessment stage until the evaluation stage. Nowadays, electronical nursing documentation system has been developed on some health services, however the language used still does not have the same standard.
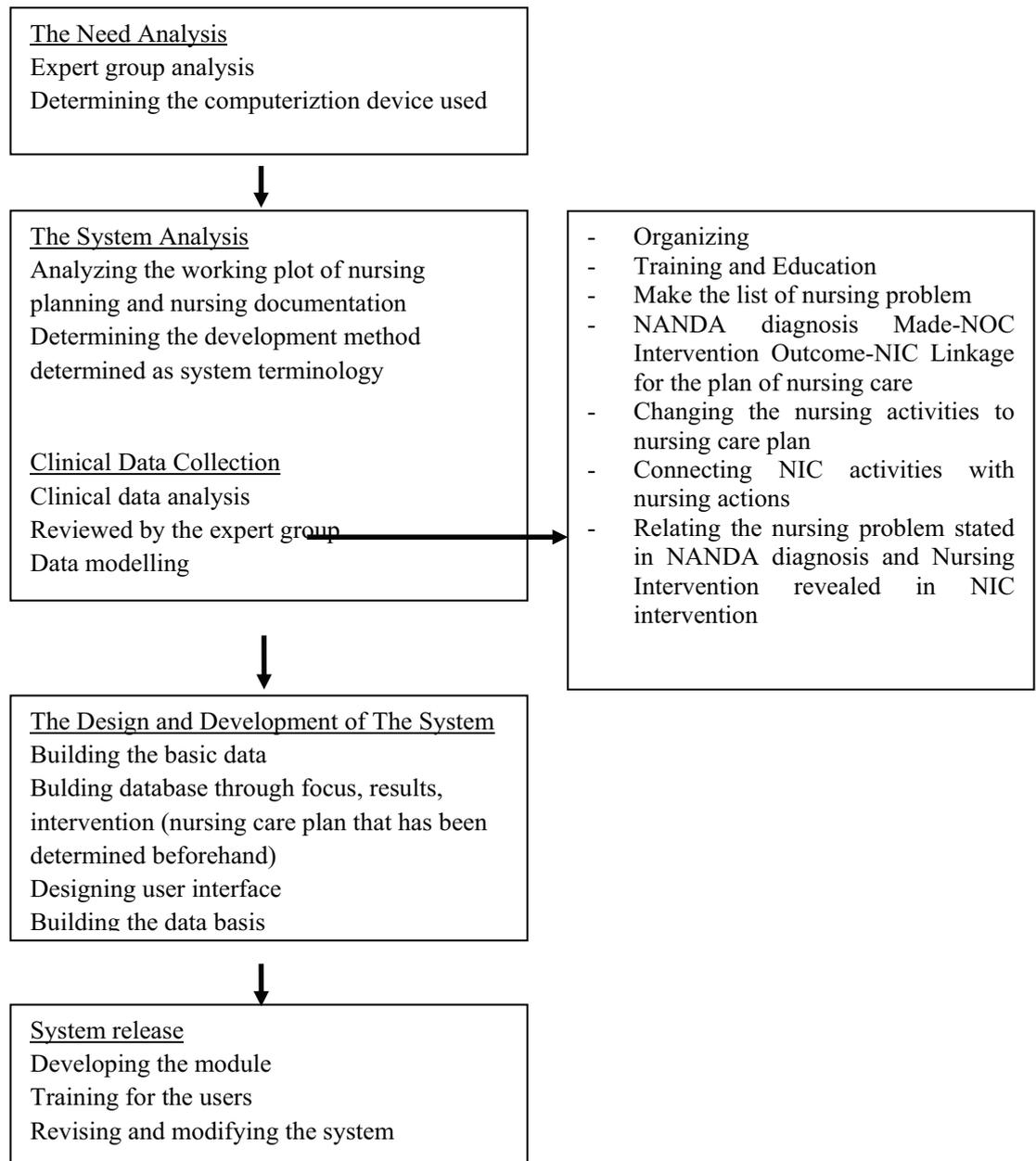
Figure 1: The process of developing nursing information system by using NNN terminology [15].

4. Conclusion

.Nursing information system is combining nursing, information, and computer science to process and manage the data to be the knowledge to use in the nursing practice. The development of nursing information system focuses on the nursing process which covers the process of assessment, nursing diagnosis implementation, nursing intervention, implementation, and nursing evaluation. The process of this nursing information

system design has been conducted through stages consisting of need analysis, system analysis, clinical data collection, design and development, and system release.

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