

# Electronic Nutrition Care Process Accelerate the Documentation Time at Saiful Anwar Hospital Malang

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## ABSTRACT

Nutrition care is one of hospital health care that needs an information system to support documentation of Nutrition Care Process. There are some barriers in implementing NCP, one of them is lack of time in implementing Nutrition Care Process. Computer based information system is expected to be a solution to overcome the barrier. Some studies show that using computerized information system is faster than manual system. Nutrition Care Process (NCP) Electronic is a computer based application that processes data and records nutrition care information. This application was tested by compare it with manual documentation system to find out which documentation system was faster. The main objective of this study was to compare manual and computer based documentation system using NCP Electronic in Saiful Anwar Hospital. This was pre experimental study with one group pre-post test design. Eight Dietitians in Internal Medicine Department were involved to documenting 40 Diabetes Mellitus type II patients. Dietitians documented nutrition care process patients with both manual and electronic system. Data were collected by observing documentation time process. Statistical test was perform using paired t-test. Documentation using NCP Electronic was faster than manual system. It took 6.34 minutes using NCP Electronic which was faster 2.20 minutes than manual system. Significant difference were note between documentation time using NCP Electronic and manual system ( $p < 0.05$ ). There were significant different between documentation time using NCP Electronic and manual system. NCP Electronic documentation time was faster 2.20 minutes than manual system.

**Keywords:** Dietetics, Documentation, Medical informatics application, Time and motion, Nutrition care process.

## 1. INTRODUCTION

Information system is very important to support Nutrition Care Process (NCP). Nutrition Care Process is a systematic problem-solving method that nutrition professionals use to think critically and make decisions that address practice-related problem [1]. NCP consist of 4 systematic steps, there are Nutrition Assessment, Nutrition Diagnosis, Nutrition

Intervention, Nutrition Monitoring and Evaluation. Nutrition Care Process include collecting data, processing data and documenting data to produce important information for dietitian. Using information system for dietitian has a great benefit to manage much information for making decision [2].

Implementation of NCP in fact face some barriers. One of the major barrier to implement NCP is much time needed [3]. Study about NCP Implementation in Hasan Sadikin Hospital showed that documentation of nutrition assessment and diagnosis was uncompleted because dietitian wanted to save time [4]. Another study showed that manually calculating nutrition requirement in patient was not demonstrated because of lack of time [5]. Computer based information system is expected to be a solution to overcome the barrier.

Information system both manual and computer have to provide good quality of information. Some studies showed information quality using computer information system in time dimension. It showed that using computer system is faster than manual system. Using

computer system reduced 68% time to calculate nutritional needs and menu planning in patients compared to manual system [5]. The other studies also showed that using computer system to document NCP was 13 minutes faster than paper-based system [6].

This study used computer based system to help dietitians record NCP. It can process data and record nutrition information. This computer system record all NCP steps, automatic calculator and provide electronic International Dietetic and Nutrition Terminology (IDNT) as a standardized language of nutrition to perform nutrition diagnosis. Used of NCP Electronic is expected to help dietitian completing their task easily, faster and accurate. This computer system is still in development stage that need to be tested by documented NCP patient in hospital setting. This study was performed by dietitian in Internal Medicine Department Saiful Anwar Hospital. We performed this study at Saiful Anwar Hospital because NCP have been implemented as their daily basis nutritional care. We compare NCP documentation in typed II Diabetic Mellitus inpatients patient. The objective of this study was to compare time different between NCP documentation electronic with manual paper-based documentation.

## 2. METHOD

This was pre-experimental study with one group pre-post test design. Study was held on Saiful Anwar Hospital Malang. This was Pre-experimental study because NCP Electronic was used only on trial phase. There were two phase in this study, first was manual documentation system phase that completed as usual with paper based in service hours. Documentation of NCP used medical record. The next phase was electronic documentation system that completed using NCP Electronic application after service hours. Data input in electronic system phase was based on Data Collection Form given from investigator of the study.

Population of this study was NCP Documentation in typed II Diabetic Mellitus (DM) inpatient patients in Internal Medicine Department of Saiful Anwar Hospital. New diabetic mellitus patients who has malnutrition risk (scored  $\geq 2$ ) in screening result chosen to be sample of this study. The sample size of this study was 40 DM typed II patients documentation both in manual and electronic system. Eight Dietitians from Internal Medicine Department was join this study. The inclusion criteria of dietitians who perform the documentation were already received NCP training and have ability to operate computer.

Data collection included time spent to record NCP documentation both with manual and electronic system. bservation of process and document of Nutrition Care Process documentation including nutrition assessment,

nutrition diagnosis, nutrition intervention and nutrition monitoring and evaluation's plan

## 3. RESULTS

### 3.1. Nutrition Care Process Documentation In Saiful Anwar Hospital

Saiful Anwar Hospital has implemented Nutrition Care Process since 2006. Saiful Anwar hospital become role model for other hospital also university as good place to study NCP implementation.

Nutrition care documentation already include in medical record since 2014, integrated with the other health care documentation. There are 8 nutrition documentation form should be recorded by dietitian, Nutrition Screening Form, Nutrition Assessment Form, Problem Identification Form, Nutrition Planning Form , Integrated Patients Progress Form, Nutrition Progress Form, Nutrition Resume Form and Nutrition Education Form.

NCP begin with nutritional screening to find malnutrition risk in patient. Parameter used in screening test was weight change in last 6 months, decreased food appetite and special condition existed in patients like diabetes mellitus, chemotherapy, hemodialysis ect.

Nutrition assessment in patients was collecting data process like anthropometry, biochemical, physical and clinical condition, dietary, and patient history. Documentation of nutrition assessment is recorded in Nutrition Assessment Form. After all nutrition assessment data has been collected, dietitian should identify nutrition problem occurred in patients. The next step of NCP is nutrition diagnosis, nutrition intervention and nutrition monitoring and evaluation plan. This process recorded in Nutrition Planning Form. This form consist of review problem identification, nutrition diagnosis, nutrition intervention and nutrition monitoring and evaluation plan.

Nutrition diagnosis written with PES format (Problem Etiology Sign Symptom) using standard language from International Dietetic and Nutrition Terminology 3 which already translated into Bahasa. Nutrition intervention consist of type of diet with nutrition needs like energy, carbohydrate, protein and fat from hospital standard diet. Dietitian also record nutrition education for patients by written education material. Nutrition Monitoring and Evaluation Form consist of documentation of indicator used by dietitian to monitor and evaluate patient based on assessment data record. This study limit the observation only in assessment, diagnosis, intervention and monitoring and evaluation plan. Documentation observation of this study limited only in Nutritional Assessment Form, Problem Identification Form and Nutritional Plan form.

### 3.2. Dietitian Characteristic

This study involved by 8 Dietitians who meet our inclusion criteria form Internal Medical Department. The characteristic of dietitian is list down in the Table 1.

**Table 1. Dietitian characteristic**

Characteristic	n
Age (year)	
< 30 year	7
> 30 year	1
Gender	
Man	2
Woman	6
Working experience	
< 1 year	1
> 1 year	7
NCP training	
No	0
Yes	8
Education	
DIII	3
DIV/S1	5
Computer ability	
Poor	0
Good	8

Dietitians who involved in this study mostly aged less than 30 with working experience at least 9 months. Before this study was conducted, dietitians have received NCP training from Saiful Anwar Hospital also tutorial how to operate NCP Electronic from investigator. All the dietitians who participated in this study also have ability to operate the computer at least Ms. Office and Windows.

Eight dietitians recorded 40 nutrition care documentation DM typed II patients both manually and electronically with NCP Electronic. These Dietitians spread in several rooms including Room 22, 24B, 24C, 25, 26, 27, 28, 29, Pulmonary, Cardiovascular Care Unit (CVCU), Stroke Unit (SU), and Pulmonary High Care Unit (PHCU). One Dietitian work in one room, but there are 3 dietitians who worked in 2 rooms, CVCU and SU, Room 26 and PHCU, Room 24 and 29.

Fourty DM typed II cases was divided equally by eight dietitians, so each dietitian should record 5 DM cases both manually and electronically. During data collection process, DM typed II patients were difficult to find in some room. Because of that, investigator added another case beside DM typed II (cancer, kidney disease, heart disease and cardio vascular accident (CVA)) to obtain relatively the same number of documentation. Investigator done this in order to get relatively the same documentation load for dietitians.

### 3.3. Comparison Between NCP Manual and NCP Electronic

Before data collection process begin, we make adjustment for NCP Electronic so every part of NCP manual in medical record include in NCP Electronic. Table 2 list the difference part in NCP manual and NCP Electronic.

**Table 2. Comparison between ncp manual and ncp electronic**

No	Nutrition Care Component	NCP Manual	NCP electronic
1.	Personal Data	Medical Record ID Patient Name Date of Birth	Patent ID
			Patient Name
			Date of Birth
			Address
			Gender
			Age
			Religion
			Education
			Job
			Dianosis
			Dietitian
2.	Anthropo- metry	Weight	Record Room
			Record Date
			Record Time
			Weight (complated with estimation formula)
			Height (complated with estimation formula)
			Ideal Body Weight (IBW)
			Body Mass Index (BMI)
			MUAC
			Knee High
			Nutritional Status (% MUAC dan BMI)
			Heigh Estimation
			Nutrition Problem Identification
			MUAC
			Waist Circumference
			% MUAC
			Hip Circumference
			Nutritional Status
			Waist Hip Ratio
	Biochemi- cal	Laboratory Data	Laboratory Data
	Physical		Problem Identification
	Physical	Physical and	Physical and

No	Nutrition Care Component	NCP Manual	NCP electronic
	and Clinical	Clinical Data	Clinical data
			Past Medical history
			Current Medical History
			Problem Identification
			Family medical history
	Dietary History (Past)	Allergy	Allergy
		Dietary intake pattern	Dietary intake pattern
		Menu	Menu
	Dietary History (Current)	Breastmilk feeding	Breastmilk feeding
		Food Appetite	Food Appetite
		Swallow difficulty, chewin difficulty, nausea, vomit	Swallow difficulty, chewin difficulty, nausea, vomit
		Parental/enter-al	Parental/enteral
3.	Problem identificati-on	Problem identification found in every part list down here	Found in every part of assessment
4.	Nutrition Diagnosis	Nutrition diagnosis written in PES format	Nutrition diagnosis written in PES format
5.	Nutrition Interventi-on	Hospital Standart Diet	Hospital Standart Diet
		Nutrition Compositing in Standart Diet	Nutrition Compositing in Standart Diet
		Nutrition Education	Nutrition Education
			Type of food
			Route of administration
			Other information
6.	Monitoring and Evaluation	Monitoring and Evaluation Indicator	Monitoring and Evaluation Indicator
7.	etc	Record date	In personal data part
		Signiture and dietitian name	Replace with name of Dietitian

From the table above known that every part should be input in NCP electronic is the same with NCP manual. The different things is only on categorize, like past medical history and current medical history were on the medical history part but in NCP Electronic is on physical and clinical part. Problem identification part in NCP manual available on Problem Identification Form but in NCP Electronic, is input manually in every part of nutrition assessment from anthropometry to dietary and automatically will be shown in nutrition diagnosis part. It will be easier for dietitians to make nutrition diagnosis based on problem identification result.

The different things between these two type of documentation is the NCP electronic has automatically formulation for nutritional status, and ideal body weight calculation. It also has automatically formulation for weight and height estimation.

Documentation with NCP electronic contain more data than NCP manual, even though only data shown in NCP manual should be recorded by in NCP electronic. It was helped by Data Collection Form to make data in NCP manual is the same with NCP electronic.

### 3.4. Documentation Time Between NCP Manual and NCP Electronic

The documentation time of NCP Electronic was faster than NCP manual. Dietitians took 6.34 minutes in average when using NCP Electronic and took 8.14 minutes in average when they use NCP manual. Total documentation time average using NCP Electronic was faster 2 minutes 20 seconds than NCP manual. Pair t-test showed that the documentation time has significantly different between NCP manual and NCP Electronic ( $p < 0.05$ ). It can be seen at Table III.

**Table 3. Documentation time between ncp manual and ncp electronic**

Variable	NCP Manual	NCP Electronic	p
Documentation Time (minutes)	8.14±1.94	8.14±1.94	0.0003

## 4. DISCUSSION

Statistical result showed that documentation time using NCP electronic was faster than NCP manual. The same result was found in previous study that electronic system could accelerate nutrition care process in hemodialysis patients. That study showed that nutrition assessment process using electronic system is faster than paper based system [6]. The other study stated the same result that using electronic system could reduce dietitians time 68% than manual system [5]. Survey that has been performed in University of Illinois Hospital

which already implemented electronic system of documentation for a year also show that 51,5 % of respondents said that using electronic system is much saving time than manual system [7].

The time reduction exist when using NCP electronic was because there are some feature that can not showed in manual system. In anthropometry part, there was automatically calculate and interpret nutritional status in patient. In biochemical, physical and clinical part has automatically interpretation of laboratory test and physical and clinical examination test. In nutrition diagnosis part has IDNT electronic that showed nutrition diagnosis with their code. In intervention part has hospital standard diet with energy and another nutritional needs choice.

This benefit of using electronic system also found in other study. Automatically import data, automatically calculation of anthropometry data, automatically calculation of nutritional needs using electronic nutrition database (energy, protein, mineral), automatically calculation of nutritional goal compare actual intake [6]. The other study also has automatically calculation of patient needs and menu's plan [5].

Using electronic system in hospital aimed to achieve fast and accurate service to patient. Documentation time reduction showed that the system is efficient. Time efficiency is the major factor used to assess quality of electronic documentation system. Time efficiency is important to be evaluated because increasing time spent for electronic documentation known as a barrier to implement of electronic system [8]. The other study also showed that time is main factor in electronic system acceptance [7].

Using of electronic documentation system is expected to give dietitian more time to interact with patients and will be impact in service quality [9]. Time efficiency will give more time to dietitian to do another task like screening, academic research and professional development [5].

## 5. CONCLUSION

Using NCP electronic accelerate documentation time of Nutrition Care Process compare with manual paper based system. NCP Electronic documentation time was faster 2.20 minutes than manual system. This result expected to give benefit for patient service.

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