

Conference Paper

Comparison of Documentation Quality using Electronic Nutrition Care Process (NUCAPRO) and Manual System

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Hospital nutritional care requires a timely, accurate and complete information delivery to the patients. Some barriers found in the documentation process include incomplete documentation and errors in calculating patient's nutritional needs. We developed NUCAPRO (NCP Electronic), a computer-based system, to document the nutritional care process and help dietitians in calculating a patient's nutritional needs. This computer system was compared with a manual system to find out which of the two provided more accurate and complete documentation. This pre-experimental study used a pre-post-test design. Eight dietitians were recruited from the Internal Medicine Department Hospital in Malang to perform the documentation of the nutritional care of 40 diabetes mellitus patients. The documentation was performed using a manual system and NUCAPRO. The completeness and accuracy of documentation were compared between the two systems. Statistical analysis was done using McNemar. The results showed no difference in terms of completeness and accuracy of documentation between the two systems ($p < 0.05$). However, the error in calculation using NCP Electronic was found to be lower than the manual system. We suggest developing an alert feature for the system so that the process is more efficient.

Keywords: dietetics, documentation, medical informatic application, completeness, accurate, error

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1. Introduction

Hospital is a complex organization which depends on timely, precise and accurate information [1]. A timely, precise and accurate information can be fulfilled with information system [2]. Nutrition care is one of the health care that also need information system to support Nutrition Care Process Documentation. Nutrition Care Process (NCP) is a problem solving method used by nutritional professional to think critically for address

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nutrition related problem and provide safe and effective quality of nutritional care. It consists of four interrelated steps: nutrition assessment, nutrition diagnosis, nutrition intervention and nutrition monitoring and evaluation [3]. Nutrition care process steps described by standard language called International Dietetics and Nutrition Terminology (IDNT). The Nutritional Care Process and International Dietetics and Nutrition Terminology currently being implemented by dietitian all over the world including in Indonesia.

Study showed that Dietitians found several barrier for implementation of nutrition care process. Implementation nutrition care process in Hospital in Bandung show that incomplete documentation found because dietitian wanted to save time [4]. Another study showed that dietitian did not calculate nutrition requirement for patient because lack of time [5]. Nutrition care process was poorly documented because lack of time and inadequate number of personnel. Adequate documentation is important for high quality of care and patient safety [6].

Computer based system is expected to overcome the barriers for implementation NCP and provide high quality of documentation. Using computer system is faster also delivering high quality care by improving accuracy and completeness of documentation [7]. Studies showed that using computer system reduced 68% time to calculate nutritional needs in patients [5]. Other studies also showed the same result, using computer system in haemodialysis unit is faster than using manual or paper based system. It also show significant improvement in efficiency of nutritional care and effectiveness related to patient outcomes [8].

In this study, we develop NUCAPRO (NCP Electronic) a computer based system to record nutrition care process documentation, automatic calculate patients nutritional needs, and provide electronic International Dietetic and Nutrition Terminology for nutrition diagnosis. This computer system is a prototype that need to be tested in hospital setting. The objective of this study was to compare documentation accuracy and completeness in nutrition care process documentation using NUCAPRO with manual paper based system.

2. Material and Method

This was pre-experimental study with one group pre–post-test design. This study was held in one of the hospital in Malang, Indonesia. Pre-experimental study was used because NUCAPRO used was only on trial phase. There were two phase of this study, the first one was manual documentation system, it was done as usual with paper based

system in service hour. The second phase was electronic documentation system phase using NUCAPRO after service hour.

Eight dietitians in Internal Medicine Department at Hospital in Malang were involved to record nutrition care process of 40 Diabetes Mellitus typed II patients. The patients who has malnutrition risk (scored ≥ 2) according to screening result was chosen to be sample of this study. The inclusion criteria of dietitians who join this study was already received NCP training and have the ability to operate computer.

Data collections include completeness of documentation and accuracy documentation. Completeness of documentation was assessed using completeness documentation form, which was include all of the item in nutrition care process documentation in medical record. Accuracy of documentation was assessed with recalculate nutrition status using body mass index and mid upper arm circumference. Observation of process and document of nutrition care process including Nutrition Assessment, Nutrition Diagnosis and Nutrition Monitoring and Evaluation's plan.

McNemar was performed to analyse categorical data using STATA 12.1 statistical program. This study was held after obtained ethical clearance from the medical and health research ethics committee (MHREC) of Universitas Gadjah Mada

3. Results

3.1. Nutrition care process

Nutrition care process has been implemented in this hospital since 2006 and include in medical record since 2014. There are 8 Nutrition care process documentation forms should be record by dietitians: 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. Nutrition care process documentation begin with nutritional screening to identify malnutrition risk in patients. Nutritional screening using several parameter including weight change in last 6 months, decreased food appetite and special condition existed in patients (chemotherapy, haemodialysis, diabetes mellitus, etc).

Nutrition assessment is the next step done by dietitians when patients has risk of malnutrition (nutrition screening score ≥ 2). This step include recording data collection such as anthropometry, biochemical, physical and clinical condition, dietary and patient history. Documentation of nutrition assessment was recorded in nutrition assessment form. In nutrition assessment process, dietitian would identify nutrition problem occurred

in patients. Nutrition diagnosis as a next step of nutrition care process was written with PES statement (Problem, Aetiology, Sign Symptom) using International Dietetic and Nutrition Terminology in Bahasa. Nutrition interventions consist of type of diet given to patients and also nutrition education. 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.

3.2. Dietitian characteristic

Eight dietitian who meet inclusion criteria was involved in this study. The characteristic of dietitian was list down in this table below

TABLE 1: Dietitian characteristic.

Dietitian characteristic	Number	Percentage (%)
Age (yr)		
<30	7	87.5
>30	1	12.5
Gender		
Man	2	25
Woman	6	75
Working experience (yr)		
<1	1	12.5
>1	7	87.5
Received NCP training		
Yes	8	100
No	0	0
Education		
Diploma degree	3	37.5
Bachelor's degree	5	62.5
Ability to operate computer		
Yes	8	100
No	0	0

Source: Author's own work.

Dietitian characteristic who join this study mostly aged less than 30 with working experience at least 9 months. All of dietitian have received nutrition care process training from hospital also NUCAPRO tutorial from investigator. They also have ability to operate computer at least Ms Office.

Eight Dietitians recorded 40 nutrition care documentation DM typed II patients both manually and electronically with NCP Electronic. Dietitians worked 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). Forty 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 cardiovascular accident (CVA)) to obtain relatively the same number of documentation. Investigator done this in order to get relatively the same documentation load for each dietitians.

3.3. Documentation completeness between manual and NUCAPRO systems

Completeness documentation in this study focus on nutrition assessment form, problem identification form and nutrition planning form. This table below describe each section assessed in completeness in documentation.

Incomplete manual documentation only found in nutritional status section which is perform by 2 dietitians. This incomplete documentation was because dietitian forget to complete patient's nutritional status. Based on documentation observation, there are 2 incomplete documentation using NUCAPRO which was section nutrition problem. This incomplete documentation was done by one dietitian. In manual system documentation we found two incomplete documentation as it change to computer system it became complete documentation. Otherwise, we found 2 complete documentation in manual system as it change to computer system it became incomplete documentation. Statical analyse using McNemar show that there were no different in documentation completeness between manual and computer system using NUCAPRO ($p > 0.05$)

3.4. Documentation accuracy between Manual and NUCAPRO systems

Accuracy documentation between manual and using NUCAPRO was describe in the table below.

This study show that there was 1 no calculation error in manual documentation but when using NUCAPRO we found calculation error. This calculation error documentation was because dietitian input wrong height data's patients leading to misclassification of

TABLE 2: Documentation completeness between manual and NUCAPRO systems.

Documentation section	Manual system (n)		NUCAPRO (n)	
	Complete	Incomplete	Complete	Incomplete
Medical record ID	40	0	40	0
Patient's name	40	0	40	0
Birthday	40	0	40	0
Date of recording	40	0	40	0
Anthropometric	40	0	40	0
Nutritional status	38	2	40	0
Biochemical	40	0	40	0
Physical and clinical	40	0	40	0
Past nutritional history	40	0	40	0
Current nutritional history	40	0	40	0
Past medical history	40	0	40	0
Current medical history	40	0	40	0
Nutrition problem	40	0	38	2
PES statement	40	0	40	0
Type of diet	40	0	40	0
Diet composition	40	0	40	0
Nutrition education	40	0	40	0
Monitoring and evaluation indicator	40	0	40	0

Source: Author's own work.

TABLE 3: Documentation accuracy between manual and NUCAPRO systems.

Manual documentation	NUCAPRO			P-value
	Calculation Error	No. Calculation Error	Total	
Calculation error	0	6	6	0.058
No calculation error	1	33	34	
Total	1	39	40	

Source: Author's own work.

patients nutrition status. Otherwise we found 6 manual documentation which has calculation error documentation became no error documentation when using NUCAPRO. McNemar statistical analysed show that there was no different in documentation accuracy between manual and using NUCAPRO. However error documentation found when using NCP Electronic was lower than manual system.

4. Discussion

Completeness known as one of the dimension of information and also quality aspect of electronic system. This study showed that there was no different in completeness between using manual system and NUCAPRO. In manual system, incompleteness found in nutritional status interpretation. Previous study show that the weakness of manual system was incomplete documentation result to quality of health service [9]. Incomplete information leading to delay or error in decision making [10].

Incomplete documentation also found in computer system using NUCAPRO. This incomplete documentation found in problem identification section. This result also has the same finding with study conducted by Ekawati. It showed that 50.12 % incomplete documentation found in electronic medical record including general condition, physical examination, diagnosis with ICD X code, medical prescription and laboratory assessment [11]. Another study also state that incomplete documentation was found in electronic documentation. Some missing information related to medical prescription mainly occur during patient first visit [12].

Using electronic system cannot guarantee completeness of documentation. This is occur due to omission and error made by health worker. The need to record documentation of patient's data can be burdensome for health worker as a result data accuracy is not maintained, delays occur which result in incomplete documentation of patient's data [13]. Health worker behavioural factor are factors that play an important role in quality of data documentation. Good documentation is fully determined by completeness and consistency of health worker to record information into electronic system during health service activities [14].

Problem identification section was the incomplete documentation in computer system using NUCAPRO. This section completed according to nutrition assessment steps during nutrition care process. NUCAPRO has no automation feature and reminder feature in problem identifications section, so whenever user did not complete this section, they can continue to the next section. This was the weakness of NUCAPRO where problem identification should be entered manually resulting incomplete documentation possibility. Adding reminder feature expected to be a solution to overcome the incomplete documentation problem in NUCAPRO. This addition will help user to complete each section of problem identification before continuing to the next section of nutrition care process documentation. Automation feature also increase completeness of documentation compared to manual system [15]. Automation also be a solution to solve any incompleteness in the problem identifications sections. This has the same result

with previous study, it show that addition of automatic feature in electronic systems significantly increase documentation completeness compare to manual system [16].

Calculation error in manual documentation system and using NUCAPRO specify to nutrition status calculation using body mass index interpretation and mid upper arm circumference interpretation. This study show that calculation error in NUCAPRO was lower than using manual or paper based system as it stated in previous study that using electronic system minimize error in nutrition patient's need calculation [5]. The same result were also found in the use of an electronic system for the calculation of the Total Parenteral Nutrition (TPN) formula where the electronic system has absolutely no errors while manual system was found 2.98% error [17]. Another study show that electronic system a was also reducing error in calculation of Total Parenteral Nutrition formula [18].

McNemar statistical analyse show that there was no significant different calculation error between manual system and using NUCAPRO, however error calculation found lower in electronic system using NUCAPRO. Manual documentation system has 6 calculation error finding however electronic system using NUCAPRO found only 1 calculation error. According to document observation, calculation error in NUCAPRO occurred because dietitian input wrong data leading to misclassification of nutritional status interpretation. The existence of calculation error in this study was caused by the factor of NUCAPRO users. Similar errors have been found in other studies, in electronic system, error are also found because of nutritionist error in entering data [5]. Even the electronic system is completed with automatic calculation feature, the result will still depend on the user when entering data. Well-designed system will not produce perfect result without user accuracy and attention to detail [5].

The automation of calculation can reduce calculation error compared to manual systems. The manual system is prone to error, in this study calculation error occur because dietitian input wrong cut off in the mid upper arm circumference denominator formula. The use of electronic system that has automatic calculation can ease the burden on manual calculations. The use of an electronic system is able to offer easy, fast and safe nutrition care. The existence of an integrated electronic system in health service practices can increase efficiency and also improve the quality of nutrition service [5].

5. Conclusion

There was no different in completeness and calculation error documentation found between manual system and using NUCAPRO, however calculation error using NUCAPRO was lower than manual system. Improvement in NUCAPRO feature is

further needed to increase completeness of nutrition care process documentation, adding automatic feature and reminder feature will give the benefit for user. Future study should consider the benefit using NUCAPRO in community setting also develop handheld device application for documentation of nutrition care process.

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Conflict of Interest

No potential conflict of interest was reported by authors.

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