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# Article Hospimeal: website-based nutrition care process digitalization

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Abstract: The nutrition Care Process (NCP) is a systematic approach or standard to provide comprehensive nutritional care for patients or clients. NCP consists of 4 interrelated steps, namely nutrition assessment, nutrition diagnosis, nutrition intervention, nutrition monitoring and nutrition evaluation. Implementation of NCP in many health services facilities face some barriers because of using manual NCP, such as human error, time-consuming, and incomplete documentation. Digitalization of NCP has proven to be beneficial in terms of efficiency of time and provision of electronic data to improve patient services. This study aimed to develop Hospimeal as a website-based Nutrition Care Process (NCP). The development of the web-based NCP application carried out in this study used the waterfall method. The stages of the waterfall method are need analysis, study of literature and data retrieval, system requirements, system planning, system implementation and testing, digitalization of NCP management in website. Digitalization of Standardized Nutrition Care Process (NCP) management can be developed in the form of a website called Hospimeal. This website provides nutritional care to patients/clients starting from nutrition assessment, nutrition diagnosis, nutrition intervention, nutrition monitoring, and nutrition evaluation. The Hospimeal website can be operated by the relevant nutritionist/dietitian. At the beginning of the display there is a Login menu which can be used by nutrition-ists/dietitians to enter the website

Keywords: nutrition care process, digital, hospital, nutrition, dietetics

## 1. Introduction

Comprehensive nutritional care must be provided by a nutritionist or dietitian to the patient. This is a demand or obligation that must be carried out. This is to make patients/ clients have good nutritional status by intervention with various causal factors. In order to provide comprehensive nutritional care process, nutritionist and dietetian in many countries used a standard, commonly known as the Nutrition Care Process (NCP) or adopted in Indonesia as the Proses Asuhan Gizi Terstandar (PAGT) [1], [2].

Nutrition Care Process (NCP) is a method for diagnosing and developing systematic nutritional intervention plans for nutritionists based on existing nutritional problems [1]. NCP is part of the nutritional care model. The four steps of the nutritional care process are assessment, diagnosis, intervention, and nutritional monitoring and evaluation [3], [4]. The use of NCP does not mean that all patients/clients receive the same treatment, but each patient receives nutrition care or treatment that is tailored to everyone's condition. NCP integrates the patients'/clients' condition with scientific evidence (evidence-based). Therefore, through NCP, nutritionists and dietitians make decisions that are consistent, effective, and grounded in scientific rationale [1], [3], [4].

Currently, NCP is implemented in all health service facilities, such as hospitals, clinics, and community health centers [5]. However, most health service facilities still use manual NCP without using an automated electronic system. The task or work performed manually is very susceptible to human error and are time-consuming, resulting in reduced efficiency and effectiveness, as well as sloppy reporting [1], [6]–[9]. The development of a computer-based information system for nutrition care process has proven to be

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**Copyright:** © 2024 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/license s/by/4.0/). beneficial in terms of efficiency of time and provision of electronic data so as to improve patient services [9], [10].

Based on the problems that arise due to the manual application of NCP and considering the large role of NCP for nutritionists, it is necessary to develop a digital and automated computer based NCP information system to simplify the work of nutritionists and increase their efficiency [10], [11]. The development of web-based NCP will speed up and increase the accuracy of nutritionists' work thereby reducing errors. The web-based application was chosen over desktop-based applications because it can be accessed anywhere, cheap, simple and does not require high computer specifications [11], [12].

Similar studies state that apart from being important, the electronic development of NCP has a vital role [13], [14]. On the other hand, it is very important that nutritionists continue to follow developments in this technology and become the main actors in the era of disruption (not just users) so as not to be left behind by the massive transformation of the digital era everywhere [8]. Therefore, This study aimed to develop Hospimeal as a website-based Nutrition Care Process (NCP).

## 2. Materials and Methods

Hospimeal Research: Digitalization of web-based Nutrition Care Process (NCP) was established based on the need for digitization of NCP. The research method used is the waterfall method because the development stage was carried out in stages. The stages of the waterfall method are requirements analysis, system design, implementation and unit testing, system integration and testing, and operation and maintenance [15], [16]. The stages/flow of this research can be seen in Figure 1.



## 2.1. Needs Analysis.

Problem identification is the stage of searching for problems using needs analysis. Needs analysis was carried out on dietitians from several hospitals and clinics through Focus Group Discussions which were conducted online via Zoom Meeting. The purpose of this FGD was to determine the needs of hospital and clinic dietitians regarding digital NCP to help with their work. The result of need analysis produced the concept of NCP digital needed by nutritionists/dietitians in hospitals and clinics. The concept that should be present in NCP digital, namely (1) automatically calculation and categorization of data assessment; (2) automatically selecting nutrition diagnosis, (3) integration with the diet leaflet for patients, (4) integration with medical record and other health care workers system, (5) there is a printout of the results of Assessment, Diagnosis, Monitoring, and Evaluation [17].

#### 2.2. Literature Study and Data Collection

At this stage, information is collected related to the research being carried out.

## 2.3. System Requirements

At the system requirements engineering stage, problems are identified that produce as-is business processes and from the analysis of these business processes produce to-be business processes as proposed new business processes. Apart from that, at this stage a general description of the system to be developed is also created, identification of actors and their characteristics, requirements specifications and descriptions are defined in the form of a requirements list and then modeling is carried out in the form of a use case diagram. After that, each requirement on the requirements list is created as a use case scenario.

#### System Overview

Hospimeal is a system developed on a web basis. This system helps health workers, namely nutritionists, at the TEFA Nutrition Care Center in serving and providing nutritional care to patients/clients. This system has features in the form of (1) registration of new patients/clients, (2) recording patient/client data (nutritional assessment/study) which includes anthropometric data, biochemical data, physical/clinical data, eating history data, and patient history data, (3) nutritional diagnosis, (4) patient/client follow-up, (5) menu design, (6) discussion with a nutritionist [18].

#### Actor Identification

The actors who will be used for access rights to the system being developed are the admin and nutritionist. Admin is the person who has full control over the system and Nutritionist is the person who serves patients and carries out patient service operations on the system.

#### Functional Requirements and Non-Functional Requirements of the System

Functional requirements are the main functions that must exist in the system. So that when this function is executed it solves the problem with the desired results. Supporting functions are determined in this section, namely non-functional requirements. The requirements obtained are in the form of compatibility, which means the system must be able to be used in browsers such as Opera, Edge, Chrome and Firefox.

## Use Case Diagram

Use case diagram to represent actor behavior.

## 2.4. System Planning

At the planning stage, architectural design, data design and component design will be carried out. The data plan contains a representation in the form of an ERD (Entity Relational Diagram) image.

#### 2.5. System Implementation and Testing

At the system implementation stage, a system will be created based on the previous stages and a system will be built in the form of a website. And at the testing stage, unit testing will be carried out using white box techniques, integration testing and validation testing using black box techniques on functional and non-functional requirements.

#### 3. Results

Hospimeal Research: Digitalization of web-based Nutrition Care Process (NCP) was implemented based on the need to build a Nutrition Care Center (NCC) which is one of the Teaching Factories (TEFA) at the Jember State Polytechnic. This research was conducted since June 2021. This research resulted in a Standardized Nutrition Care Process (NCP) website called "Hospimeal". The website address of Hospimeal, namely <u>http://hospimeal.com/</u>. This website functions to provide nutritional care to patients/clients starting from nutrition assessment, nutrition diagnosis, nutrition intervention, nutrition monitoring, and nutrition evaluation. Therefore, the Hospimeal website contains sections that can be used to carry out the NCP stages.

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Figure 2. Hospimeal Login Display

After logging in, you will be presented with an overview of the front / home / dashboard of the Hospimeal website. On this page there is a menu for visiting nutritional values which can be used to search for the nutritional value of a food/food ingredient. On this page there are also several articles related to nutrition [18].



Figure 3. Dashboard display

Apart from the Dashboard, there are also several menus including Master Collection, Patients, Calendar and Consultation. The calendar menu is used to create and view consultation schedules for patients/clients. Patient consultation schedules can be added by pressing the "+ Patient Schedule" section, then the schedule will appear on the calendar [18].



Figure 4. Consultation Schedule Calendar Display

The patient menu functions to add and display a list of patients. New patients can be added to the list by pressing the "+ Add" button [18].

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Figure 5. Patient List Display

In the Consultation menu there are several menu sections, such as: assessment, diagnosis, intervention, results, monitoring. In the Assessment section there are several sections such as Biodata, Anthropometrics, Biochemistry, Clinical Physical, Diet, Eating History. Biodata is used to enter patient/client personal data/information, such as name, address, cellphone number, date of birth, BPJS number, education, occupation, previous medical history, family medical history, etc [18].

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Figure 6. Assessment Display: Client/Patient Information

In the Biochemistry Assessment section, it is used to enter the results of biochemical examinations from patients/clients, such as levels of hemoglobin, cholesterol, uric acid, SGOT, SGPT, etc [18].

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Figure 7. Assessment Display: Biochemical Examination

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Figure 8. Assessment Display: Clinical Physical Examination

The Assessment menu in the Dietary Pattern section can be used to enter patient dietary pattern data, such as diet, food allergies/intolerances, water intake, supplements, alcohol, etc [18].

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Figure 9. Assessment Display: Eating Pattern

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The Assessment menu in the Eating History section can be used to enter data on food consumed by the patient or data on food recall results from the patient. After the food consumed is entered, the amount of energy and nutrient intake consumed by the patient/client will appear. This section can also be used to plan the meal/diet menu that will be given to the patient [18].

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Figure 10. Assessment Display: Eating History

The Diagnosis menu is used to enter a patient's nutritional diagnosis. Nutritional diagnosis consists of Problem, Etiology, Sign/Symptom columns. Nutritionists can determine the problem a patient is experiencing by pressing the Problem section, which then displays various problem options that can be selected. The Etiology section can be entered by typing the etiology/cause of the problem experienced by the patient. The Sign/Symptom section can be entered by typing the signs and symptoms experienced by the patient/client according to the problem and etiology experienced. After the Problem, Etiology, Sign/Symptom sections are filled in then at the bottom the confirmed Nutritional Diagnosis will appear [18].

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Figure 11. Nutrition Diagnosis Display

In the Intervention menu, the Dietary Principles section can be used to calculate the patient's/client's nutritional needs and determine the distribution of nutrients in accordance with the patient's/client's dietary principles. This section will be used as a basis for creating a meal menu for patients/clients [18].

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Figure 12. Display of Nutritional Interventions

The Results menu will display a preview of assessment data, nutritional diagnosis, nutritional intervention, as well as patient monitoring and evaluation results [18].

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Figure 13. Results display

The Hospimeal website can be operated by the relevant nutritionist/dietitian. At the beginning of the display there is a Login menu which can be used by nutritionists/dietitians to enter the website.

## 4. Conclusions

Digitalization of Standardized Nutrition Care Process (NCP) management can be developed in the form of a website called Hospimeal. The website address of Hospimeal, namely <u>http://hospimeal.com/</u>. This website functions to provide nutritional care to patients/clients starting from nutrition assessment, nutrition diagnosis, nutrition intervention, nutrition monitoring, and nutrition evaluation. Therefore, the Hospimeal website contains sections that can be used to carry out the stages of Nutrition Care Process (NCP).

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