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Article Optimizing Nutrition Care Management at Nutrition Care Center (NCC)

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Abstract: In nutrition care services, the creation and storage of medical records at the Nutrition Care Center (NCC) are still relatively simple and paper-based or manual. Additionally, management challenges, in the form of system constraints, are one of the obstacles to healthcare management at NCC. Therefore, there is a need for optimizing healthcare management at NCC. The aim of this study is to optimize nutrition care management at the NCC clinic through the use of EMR (Electronic Medical Records) facilitated by QR Codes and the implementation of a Whatsapp Bot. The results indicate that optimizing Nutrition Care Management through the Implementation of EMR with QR Codes and Whatsapp Bot simplifies nutritionists' access to previous client allergy and therapy history in one view and facilitates clients in accessing their medical record number without a physical card. This research has also designed a system that can be used both through web and mobile platforms

Keywords: Healthcare service management; Nutrition Care Services; Nutrition Care Center

1. Introduction

The Nutrition Care Center (NCC) is a teaching factory (TEFA) at the State Polytechnic of Jember (Polije) that provides nutrition assessment and diagnostic services. Since its inauguration, NCC has been visited by both internal and external clients. Data recording and storage are still done manually using paper, which poses a risk of document damage and loss [1]. Medical records are crucial for the healthcare system as they contain records and documents regarding patient identity, examinations, treatments, procedures, and other services provided to patients [2]. The electronic document management system in the healthcare sector, known as Electronic Medical Records (EMR), is a global trend. Its presence adds value by improving performance, offering a web-based information system, enabling seamless integration of all data, and simplifying data management, access, and distribution processes, thus enhancing work efficiency and effectiveness [3].

QR Code (Quick Response Code) serves as a solution for tracking documents using a QR Code scanner to obtain encoded information. The function of QR codes is to transform information into codes [4]. QR Code usage is widespread in various fields, including medical records, due to its ability to integrate information and facilitate document completeness [5]. This model provides convenience for patients to monitor diagnostic results, treatment outcomes, and medication history [6]. Additionally, the support of an information service system in the form of a WhatsApp bot is required, as it can simulate artificial intelligence to engage in conversations with humans, thereby making the service more effectivep [7]. Client visits to NCC have seen an increase, as shown in Figure 1. In alignment with the NCC master plan depicted in Figure 2, the development of service types and complexity will be enhanced over the next five years. Collaborations for nutritional screening with other organizations such as educational institutions, offices, and the elderly have also been initiated. This allows for an increase in both new and returning cli-

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ents, resulting in more extensive and complex information in the medical records [8]. Previous research has identified management obstacles, including system constraints, as a hindrance to service management. The use of EMR facilitated by QR codes and the implementation of a WhatsApp bot serve as the primary alternatives to establish or improve nutrition assessment and diagnostic service management according to client needs [9]. This research is a continuation of the research team's work in 2021 on designing webbased EMR systems in public health centers (Puskesmas). Therefore, the research aims to optimize nutrition care management at the NCC clinic through the use of EMR facilitated



by QR codes and the implementation of a WhatsApp bot.

Figure 1. New Patient Data and Visits

Nutrition services provided by NCC must be accompanied by medical records. The implementation of a simple and manual medical record system poses several risks, such as document damage, loss, and the need for storage space. Optimizing Nutritional Care Management through the Implementation of EMR with QR Code and WhatsApp Bot facilitates nutritionists in accessing the allergy and previous client therapy history in a single view, as well as making it easier for clients to access their medical record number without a card [10]. The utilization of technology will have a positive impact on infrastructure, and its dissemination will be more accessible to the public. This research aligns with the research agenda of the Health Department for the year 2022 and supports nutrition services at NCC, making it part of an applied research scheme with a Technology Readiness Level (TRL) of 5, meaning it is integrated into the laboratory environment and will be further developed next year. This research focuses on solving the management issues in patient nutritional care by implementing EMR with QR Code and WhatsApp Bot, with the hope that it will facilitate nutritionists in accessing the allergy and previous therapy history of clients in one view and make it easier for clients to access their medical record number without a card. It aims to organize medical record filing systematically, allowing counselors and nutritionists to monitor patients effectively [11]. This research is based on previous studies that identified management constraints as a hindrance to healthcare service management [12]. This study is a continuation of the research team's work in 2021 on the design of web-based EMR systems in public health centers.



Figure 2. TEFA Master Plan

2. Materials and Methods

This research uses a combination of qualitative research design and system design. The stages of action research are diagnosis, planning, implementation, and evaluation [13]. The Nutrition Care Center in State Polytechnic Jember is the site of this study. Interviews, observation, and documentation were utilized to obtain data. The analysis technique uses thematic analysis which includes interview transcripts, in-depth interviews, coding and analysis.

3. Results

Before optimization, it is necessary to explain the results of the identification of the service management conditions at NCC. The results are outlined as follows:

3.1 Current NCC-related Facts

- 1. The Nutrition Care Center (NCC) is a teaching factory (TEFA) at the State Polytechnic of Jember (Polije) that provides nutritional assessment and diagnostic services.
- 2. NCC patients have been visited by both internal and external clients.
- 3. Increase in NCC visits
- 4. Initiation of collaboration for nutrition screening with other organizations: education, offices, and the elderly group.
- 5. Data recording and storage are still manual, using paper, which poses a risk of document damage and loss – a management service obstacle.

Nutritional care management at NCC refers to a structured and holistic approach used to provide appropriate and effective nutritional care to patients in a clinical environment. Its goal is to understand, evaluate, diagnose, and address nutritional and nutritionrelated issues in individuals who require healthcare attention related to nutrition

3.2 The nutritional care management process at NCC involves several stages

- 1. Initial Evaluation, the process begins with the collection of information about the patient, including medical history, nutritional history, lifestyle, and current health conditions. This initial evaluation helps in understanding the individual's nutritional needs.
- 2. Nutritional Evaluation, after gathering information, the patient's nutritional status is evaluated. This involves measuring anthropometric data (such as weight, height, and waist circumference), laboratory analysis (e.g., blood analysis), and food intake assessment to identify nutritional issues or deficiencies
- 3. Nutritional Diagnosis, based on the evaluation results, a nutritional diagnosis is made. This involves identifying potential nutritional problems, such as malnutrition, obesity, or nutrition-related medical conditions.
- 4. Nutritional Care Planning, after the diagnosis is established, a nutritional care plan is developed. This includes developing an action plan that encompasses dietary adjustments, the provision of additional nutrition if needed, and behavioral change goals related to nutrition
- 5. Implementation of Interventions, the designed nutritional care plan is put into practice. This may involve nutritional counseling sessions with patients to explain the diet plan, provide information about nutrition, and offer support in adopting dietary changes
- 6. Monitoring and Evaluation, once interventions are initiated, patients are regularly monitored to ensure that the expected changes occur. Changes in nutritional status and the patient's response to interventions are evaluated, and the plan may be adjusted if necessary

- 7. Education and Training, an essential part of nutritional care management is providing education to patients about the importance of nutrition, the impact of food on health, and how to manage their diet to achieve health goals.
- 8. Reevaluation and Ongoing Monitoring, patients are periodically reevaluated to ensure that nutritional interventions continue as planned and produce the expected results.

3.3 The patient flow at NCC

In general, the patient flow at NCC is as follows: clients arrive and are received at registration, assessment, and consultation. Here is an explanation:

- 1. Registration, client visits begin with the registration process at the clinic or healthcare facility where the nutritionist practices. At this stage, clients provide basic information such as their name, date of birth, contact details, and other necessary administrative information required to set up medical records and schedule appointments.
- 2. Assessment, after the registration is completed, the client will proceed to the evaluation or assessment stage. This is the stage where the nutritionist will conduct a comprehensive assessment of the client to understand their nutritional and health situation. This assessment involves several steps:
 - a. Medical and Nutritional History, nutritionists will gather information about the client's medical history and nutritional history. This includes the client's disease history, food allergies, medications taken, and their daily dietary and nutrition habits.
 - Anthropometry, involves physical measurements such as weight, height, waist circumference, and possibly other measurements like upper arm circumference. This data helps evaluate the client's nutritional status and identify issues such as being underweight or overweight.
 - c. Food Intake Analysis Nutritionists will assess the client's daily food intake to understand eating patterns and the types of food typically consumed. This helps in identifying dietary habits that may affect nutritional health.
 - d. Laboratory Analysis In some cases, blood analysis or other laboratory tests may be required to obtain further information about the client's health condition, such as specific nutrient levels in the body."
- 3. Consultation, after the assessment stage is completed, the client will meet with the nutritionist for a consultation session. During this stage, the nutritionist will analyze the data collected during the evaluation and provide specific recommendations based on the client's needs and goals. This consultation involves several steps:
 - a. Explanation of Evaluation Results, nutritionist will inform the client about their evaluation results, including an analysis of their nutritional status and potential nutrition-related health issues.
 - b. Nutritional planning Based on the evaluation results, the nutritionist will design a nutrition plan tailored to the client's needs. This may involve structuring a balanced dietary regimen, providing nutritional recommendations, and developing health goals related to nutrition.
 - c. Provision of Education, the nutritionist will educate the client on the importance of nutrition, how to adopt a healthy eating pattern, and how to address their health concerns or nutrition-related goals.
 - d. Establishment of a Follow-up Plan, the nutritionist and the client will collaboratively plan subsequent steps to be taken, including scheduling follow-up appointments, monitoring progress, and adjusting the plan if necessary.

After the consultation is completed, clients will have a customized nutritional guide and plan tailored to their needs, with the goal of helping them achieve optimal health and fitness through appropriate nutrition. From the above identification, it can be emphasized that in healthcare service management at the NCC clinic, optimization is needed, especially in nutritional care management. The optimization of nutritional care management needs to be achieved through the implementation of EMR with QR Code and Whatsapp Bot, making it easier for nutritionists to access clients' allergy and previous therapy history in one view and facilitating clients' access to medical record numbers without a physical card. Therefore, we have developed a system design that can support healthcare service management at NCC



Figure 3. Main page prototype view

The results of this system design can be accessed through the following link:

- 1. NCC Mobile Design for Patients: <u>https://bit.ly/desainNCCmobile</u>
- 2. Running Prototype of NCC Mobile: <u>https://bit.ly/runningNCCmobile</u>
- 3. NCC Web Design for Staff: <u>https://bit.ly/desainwebpetugasNCC</u>
- 4. Running Prototype of NCC Web: <u>https://bit.ly/runningNCCwebpetugas</u>

Additionally, in designing the WhatsApp bot, this research resulted in WhatsApp transcripts, which provide an overview or message scheme for both general patients who have never been to NCC, patients who have previously visited NCC, and patient evaluations. Here is the WhatsApp bot scheme for each type of patient [14].

n of the second second			
Patient: H/ Hello NCC			
75: Hello, Welcome to NCC. Nutrition C of Jember that provides evaluation and di	are Center is a teaching factory in the State Polytechnic agnostics services for mutrition problems Please	CS: Do you feel tired or tired constantly in	the day-to-day?
proceed with answering the questions below, please type yes or no yes no further questions Back to the start menu		yes	00
yes	10	Please visit the NCC immediately.	Continue to the next question
Continue Next Ouestion	Back to Start Menu		
		CS: Do you consume the fruits in your diet	7
co para la contra de		yes	no
.s. Do you have a history of diabetes.		Continue to the next question	2
yes	10	3	Continue to the next question
Please visit the NCC immediately.	Continue to the next question	CS: Do you exercise at least three times a week?	
		yes	no
CS: Have you had any significant weight changes in the last 3 months?		Continue to the next question	
yes	10		Continue to the next question
Please visit the NCC immediately.	Continue to the next question	CS: Do you consume high-fat foods at high frequencies?	
		yes	no
CS: Do you have a history of heart disease or high blood pressure?		Please visit the NCC immediately.	Continue to the continue time
yes	no		Continue to the next theshort
Please visit the NCC immediately.	Continue to the next question	CS: Do you often feel hungry between meals?	
	Comme a un non question	yes	шо
		Continue to the next question	Continue to the next question
CS: Do you have a history of heart diseas	e or high blood pressure?		
yes	10	CS: Do you have a history of food allergies	or intolerance?
Please visit the NCC immediately.		yes	10
	Continue to the next question	Continue to the next question	Continue to the next operation
			- comme to the real diseason
CS: Do you have digestive disorders like	bioating of excess gas?	control by the first states	A MALE AND A MARKED AND A MALE AN
CS: Do you have digestive disorders like yes	no	CS: Please consult immediately with the nu and Friday at 8:00 p.m. until 3:00 a.m.	tritionist at NCC Polije, which is open every Monda

Figure 4. General Patients who have never visited NCC

The condition of the patient has ever been to the NCC	
Welcome to NCC please submit your name and registration code obtained at NCC in the format: NAME_Registration Code	
Runi Maharaun_123456	The condition of the patient has ever been to the NCC
Think you for using the NCC service. Hello, I feel a little confused about the matrition therapy program Pm undergoing. Can I ask??	Tiello Welcome to NCC please submit your name and registration code obtained at NCC in the format. NAME. Registration Code
YES	Rani Maharani 123456
I often feel drowned and powerless despite following the recommended meal plan.	
Stop therapy and return control to the NCC	Thank you for using the NCC service.
All day yesterday, I've been turning around.	Hello, I feel a little confused about the nutrition therapy program I'm undergoing. Can I ask?? YES
Stop therapy and return control to the NCC	I feel more energetic and energetic since undergoing a nutrition therapy program.
Fire also had disective problems like swelling since I started this program	Please continue therapy until check time at NCC
Stop therapy and return control to the NCC	I feel less likely to be hungry after a meal.
Twe been more likely to change my mood and get more stressed since taking this program?	Please continue therapy until check time at NCC
Stop therapy and return control to the NCC	
	T also experienced a consistent weight
Please come and consult with a matritionist at NCC Polije, which is open every Monday and Friday at 8.00 n.m. 3.00 a.m.	loss and made me more excited and my mood improved.
	Please continue therapy until check time at NCC

Figure 5. Patients who have previously visited NCC

The system above represents a solution to the issues faced by NCC. This system is believed to aid healthcare service management. Its easy implementation and simple interface ease the users in utilizing this system. With the existence of this system, the quality of service at NCC takes on a more professional character. Service quality is a crucial aspect in fostering patient and public trust to create loyalty [15]

EVALUATION OF PATIENTS

Continue to the part sensition	NO	Have you had toxible sleeping or a charge in sle	ep potterns since marting this program
Continue in the sext question	Please virit NCC immediately Please come and concelt with a outritioner at NCC Polipe which is open every. Moning and Foday at 8:00 p.a.,	Yes	ко
		Please visit NCC immediately Please come and censul, with a matri ionist at NCC Pelije which is open every Monday and Freday of	Continue to the next question
o you feel less hungry after eating as pla	anned f	8:00 p.m.	
Yes	Ne	These you had digestive disorders like gas or bler	sting since starting this program?
Continue to the next question	Plense visit NCC immediately Plense come and contrib with a nutritionist at NUC Polije which is open every Monday and Enday at 8:00 plan.	Yis	NO
		Please visit NCC immediately Please some and consult with a mitritedist of NCC Polije which is open every Monday and Friday of	Continue to the next question
		8:00 mm	
Hove you had any changes in weight sin	ore starting this program?	8:00 p.m. Do you love say dd5eulius in preporing ar io ia	nging maab as planna 19
Unverses land any charages in weight size Yes. Continue to the next question	we stretching their programs? Not Plense visit NCC immusclately Plense issue and outself, with a unbifurnist at NCC Politie which is open every Monday and Fitday at 8000 p.m.	6:00 p.m. The year low: sny difficultus in preparing in some Yas. Plane west KCC immunities of Planes cannot with a mutricitation of NCC Pails which is open every. Membry and Tabley a 8:00 p.m.	nging madras planns?? ISO 2: Cantona Schernest que don 4
leve yes had any changer in weight via Yes. Continue to the next question. Id you feel more energized and energeti	we stretching their programs? Not Please visit NCC minutuality Please issues and consist, with a untritionist at NCC Pelitic which is ropen every Monday and Pitday at 8000 p.m.	6:00 p.m. The year love: say difficultus in property or state Yes. Plane year INCO monothereby Plane com- red context with a nutritization of NCC Policy which is open every Member and Tabley a \$100 p.m. Here year feit any examples in theod of stress leve	nging mathews planets?" NO g ffort out with constigned on d s shares for any flut year sum?
Unverses land any charages in weight sin Yes. Conclume to the next question. Itd you feel more energized and energeti Yes.	we stretching their programs? Not Plense: virot NCC immustately Plense isome and oursed; with s mututionist at NCC Pelijic which is open every Monday and Friday at Billit p.m. w since undergoing a mutution discopy program? No	6:00 p.m. The year level any difficulture in property or a rate Year Please word KCC momentariest Please com- and context works another issue or NAC Poly- which is equal assay Mendey and Trinky a X100 p.m. Here year feet any examples in mond or stress level Yea	ngang manbana pinana (*) NO 2 Fant na na arthu met pu ohun 2 n sh annez tanang tha geng ran? No

Do you fiel that the recommendations in the nutrition therapy program match your dictory preferences?

Yes	No
Conferences the flue most specifier	¹ Please visit NCC immediately Please come and consult with a nutritionist at NCC Politie which is open every Monday and Friday at 8.00 p.m.
Hove you noticed an improvem starting this program	ent in the health condition or symptoms you have experienced since
Yes	No

Please come to NOC and consult with your mutritionist

Figure 6. Patient Evaluation

4. Discussion

Previous research findings indicated that management factors, such as system constraints, have been a hindrance to healthcare service management. For example, counselors couldn't monitor therapy or nutritional care conducted on an individual basis, patients forgot their medical record (MR) numbers, making it challenging to recall their previous nutritional care, and the use of a manual recording system with disorganized MR filing. Therefore, this study provides solutions to the issues identified in previous research. The utilization of an Electronic Medical Record (EMR) system, simplified with QR codes, and the implementation of a WhatsApp bot serve as the primary alternatives to address these problems and improve the management of nutritional assessment and diagnostic services according to client needs. The global trend in healthcare document management is electronic medical records (EMR) [15]. Their presence adds value by enhancing performance through web-based information systems, enabling seamless integration, management, access, and distribution of data, thereby improving efficiency and effectiveness [2]. EMR is essential to adding value and enhancing performance. With a web-based information system, all data can be seamlessly integrated, facilitating data and information management, access, and distribution, ultimately enhancing work efficiency and effectiveness. This not only provides convenience for nutrition specialists but also for clients, especially regarding the availability of their medical records and easy access for future consultations

5. Conclusions

The nutrition service provided by NCC must have complete medical records. This not only serves as a facility that can facilitate clients accessing their medical records but also provides convenience to nutritionists, especially in organizing the medical record filing system, which can be well-structured. The implementation of a simple and manual medical record system carries some risks of damage and loss, as all of these requirements take up storage space. Optimizing Nutritional Care Management through the implementation of EMR with QR Code and WhatsApp Bot makes it easier for nutritionists to access the allergy and previous therapy history of clients in one view. It also simplifies clients' access to medical record numbers without the need for a physical card, as they can simply use the QR Code. The utilization of technology will have a positive impact on facilities and infrastructure, and its promotion will be more accessible to the public.

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