Article

Implementation of Nutritional Status Information System in Improving NCC Services

Demiawan Rachmatta Putro Mudiono [1]*, Andri Permana Wicaksono [2], Indah Muflihatin[3], Ida Nurmawati [4], Niyalatul Muna [5], R. Alamsyah Sutantio [6]

[1]   Politeknik Negeri Jember ; demiawanrpm@polije.ac.id
[2]   Politeknik Negeri Jember; andri_permana@polije.ac.id
[3]   Politeknik Negeri Jember; indah_muflihatin@polije.ac.id
[4]   Politeknik Negeri Jember; ida@polije.ac.id
[5]   Politeknik Negeri Jember; niyalatul@polije.ac.id
[6]   Politeknik Negeri Jember; alamsyah@polije.ac.id

* Correspondence: demiawanrpm@polije.ac.id

Abstract: Managing data in health services is of course very complicated and requires a lot of time. Information systems in health services provide efficient benefits. The service and reporting process at the NCC is considered to be still not optimal. The impact of patient visits is still minimal and does not attract the attention of consumers. The aim of this research is to create a web-based service system at NCC. The method used is the System Development Life Cycle system development. The results of the planning found that NCC provided one of the services handled by nutritionists regarding calculating children's nutritional status based on anthropometric standards. The system analysis is divided into 2, namely functional requirements and non-functional requirements. In system design, a system flowchart, context diagram and data flow diagram are obtained. At the system implementation stage, the user has tested it using a black box test with satisfactory results.

Keywords: Nutritional Status, Information System, System Development Life Cycle, Black Box

1. Introduction

Development in the health sector has the main objective, namely to improve the level of public health, and provide health services that are broader, more equitable and affordable. The health services in question include medical record management, child health, maternal health, health education, and information management and supervision of community nutritional health. All these services are recorded, stored and reported in paper based form [1][2][3].

Managing data in health services is of course very complicated and requires a lot of time [4]. Basically, the information produced requires serious management starting from the data obtained, processed to the information produced. Data management doesn't always have to be done using a computer, it can also be done manually. It must be realized that good tools and programs without the correct data will be useless according to the "Garbage In, Garbage Out" principle. Wrong data produces wrong information. Wrong information results in wrong planning [5]. In an effort to overcome the problem of incorrect money planning, it is necessary to build a service and reporting information system [2].

The rapid growth of health information technology has greatly impacted the current global environment. Information systems in health services provide efficient benefits, increasing administrative control, quality patient care, controlling costs, and increasing profitability [6][7]. In addition, all health services in the United States have adopted

information technology in the form of electronic medical records from 9.4% in 2008 and 75.5% in 2014, 7 times the rate of adoption of electronic medical records in 6 years [8]. The success of implementing an information system can be seen from several factors, namely human, environmental and technological factors. All of these factors are very important for the implementation of information systems, besides that each factor is also interrelated [9].

Politeknik Negeri Jember is a tertiary institution that provides vocational education which applies a production/service based learning model which refers to standards and procedures applicable in industry and is carried out in an atmosphere similar to that which occurs in industry or is called a Teaching Factory (TeFa). One of the TeFas within the Jember State Polytechnic is the Nutrition Care Center (NCC). NCC is a forum that can provide nutritional services to employees and the Jember community. The aim of the NCC is to help the people of Jember overcome nutritional problems such as stunting and malnutrition [10].

The service and reporting process at the NCC is considered to be still not optimal, where services from the marketing side of the NCC still cannot be tracked by the general public. The impact of patient visits is still minimal and does not attract the attention of consumers. So because of the lack of consumers, there will be no buying and selling, if there are no buying and selling transactions then the company will of course not make a profit. Apart from that, in terms of reporting, officers still experience difficulties in reporting data starting from patient visits, nutritional status of toddlers, giving vitamins to mothers and children, to morbidity cases. One of the efforts to improve TeFa NCC services at the Politeknik Negeri Jember requires an information system which can be accessed in real time and accurately by stakeholders in accordance with developments in science and technology. Management that is said to be effective and efficient requires information, the availability of information in TeFa services is obtained from the Management Information System which is based on TeFa services [11]. This application only measures nutrition in children aged 0-60 months. The measurements in this application are in accordance with the regulations of the Minister of the Republic of Indonesia number 2 of 2020 concerning child anthropometric standards, so that the calculations will be precise on the basis imposed by the government.

2. Materials and Methods

The research method used in developing the Teaching Factory Nutrition Care Center Information System to support improved services and web-based reporting at the Politeknik Negeri Jember uses the SDLC (System Development Live Cycle) method with planning, analysis, design and implementation stages. The stages of this research method can be depicted in Figure 3.1.
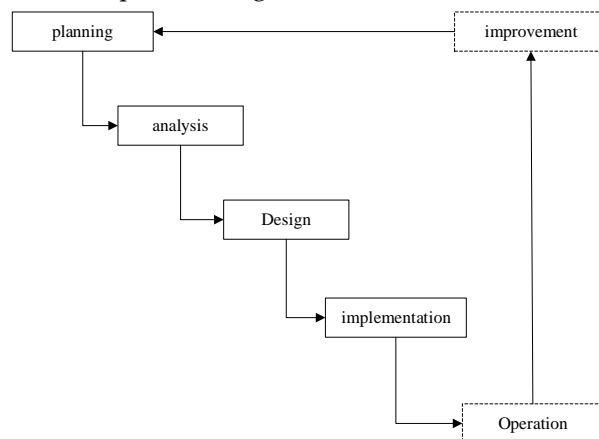
Figure 1. Method SDLC

Source: [15]

2.1 Planning

This stage is the initial stage in developing an information system for controlling medical record files in web-based services and reporting at TeFa NCC Politeknik Negeri Jember. The planning stage is carried out by defining a problem in the existing system.

2.2 Analysis

The analysis stage is carried out to find out what needs are required by the system that will be created by collecting data related to the development of an information system for controlling medical record files in services and web-based reporting at TeFa NCC Politeknik Negeri Jember.

2.3 Design

This stage is the information system stage for controlling medical record files in web-based services and reporting at TeFa NCC Jember State Polytechnic. The designs created are database design, Context Diagram (CD) and Data Flow Diagram (DFD).

3.5 Implementation

Next, the implementation stage is the stage where the program is written, tested and adjusted until it meets user needs. In terms of system implementation, it is carried out by coding (script) and system testing.

3.6 Operation dan Improvement

This stage is the stage where the system begins to be used, utilized and improvements are made to the system. However, in this case the operation and improvement of the system could not be carried out due to time constraints in the research. This stage will be implemented in the following year where by evaluating and adjusting features, the system will be refined according to user needs.

3. Results and Discussion

3.1 Planning

The Nutrition Care Center (NCC) is one of the Teaching Factories at Jember State Polytechnic which was formed in 2020. NCC provides nutritional services to all Jember State Polytechnic employees and the general public. One of the services provided by the nutritionist team is calculating the nutritional status of children. This service still uses manual calculations with anthropometric standards. Based on observations and interviews with NCC officers, obstacles were found regarding calculations that still use manuals and require a long time in determining children's nutritional status. The calculations assessed are by looking at the child's height, age and weight. Apart from that, information regarding children's nutritional status is also written down using books, this hampers the performance of officers in making nutritional status reports. The NCC officer also said that for child nutritional status services at the NCC it is necessary to develop a manual to electronic system, bearing in mind that technological advances can provide accelerated services and the resulting reporting.

3.2 Analysis System

System analysis is the next stage regarding system development needs, while system development needs include:
a. Functional requirements

Functional requirements are requirements for modules in the system, including:

1. Provide login facilities
2. Provide information related to children's nutritional status
3. Provide nutritional assessment calculations
4. Provide nutrition case assessment reports

b. Non-functional requirements

Non-functional requirements are requirements needed for system development, including:

1. PC or laptop
2. Keyboard if using a PC
3. Mouse
4. Internet connection

3.3 Design System
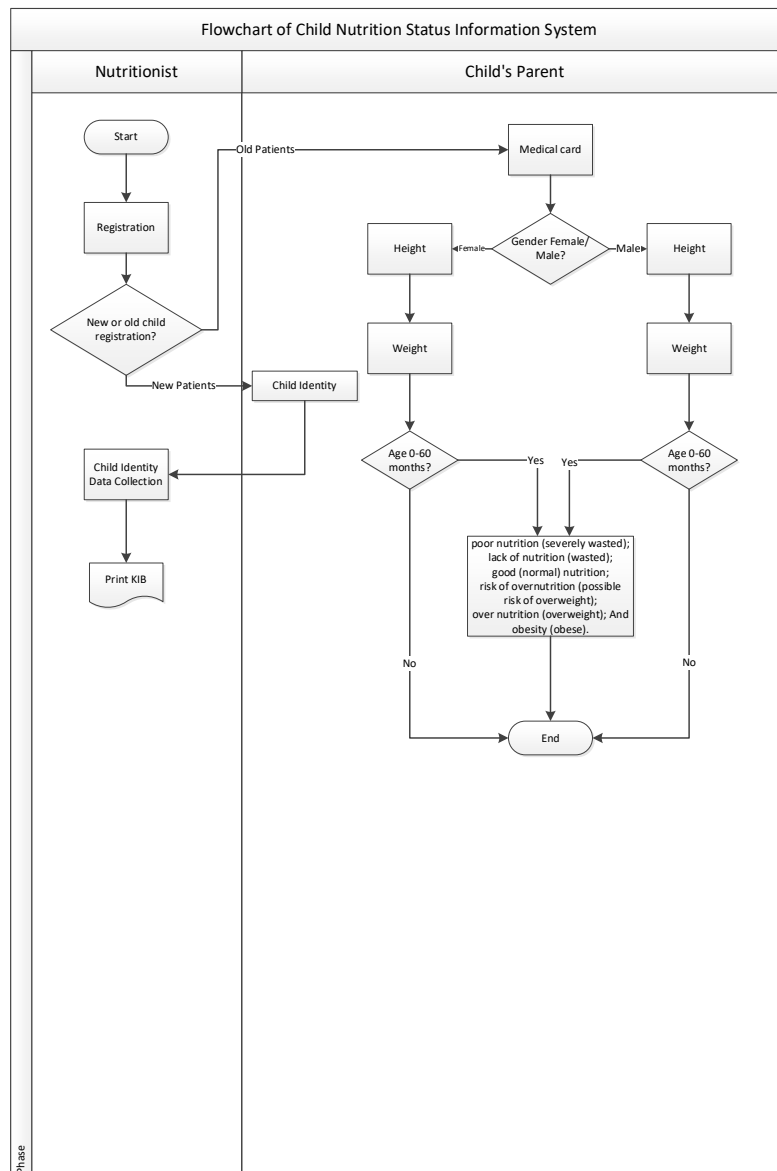
Figure 2. Flowchart System

In the picture above there are 2 entities, namely the nutritionist and the child's parents. The nutritionist will carry out the registration process in the system if the

patient is a new patient, the nutritionist will input the patient's identity into the application and will give the patient a treatment card. Next, the application will direct the patient's gender, age and height. The final stage of the application will calculate the data according to pediatric anthropometric standards and categorize the patient's nutrition.
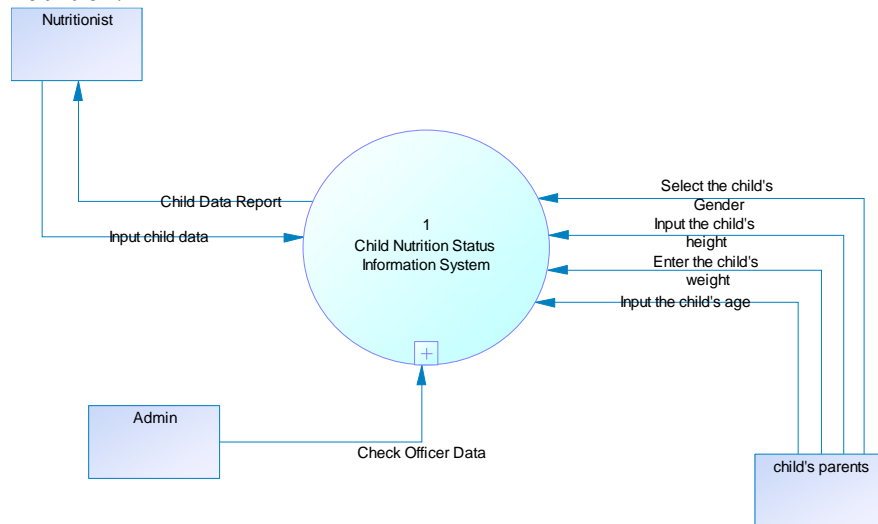

Figure 3. Context Diagram

The image above is a context diagram which is the highest-level data flow diagram regarding the application performance process. The context diagram in this application has 3 entities, namely nutritionists, admin and child parents. Each entity has flows that interact with each other in the application process.
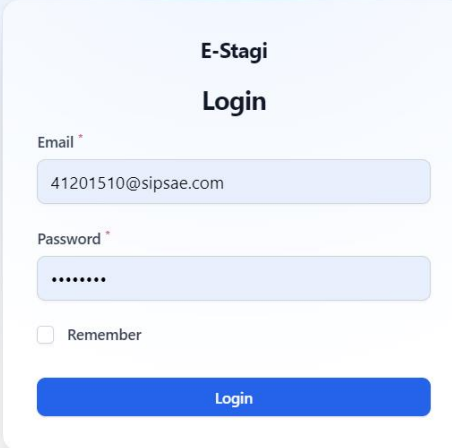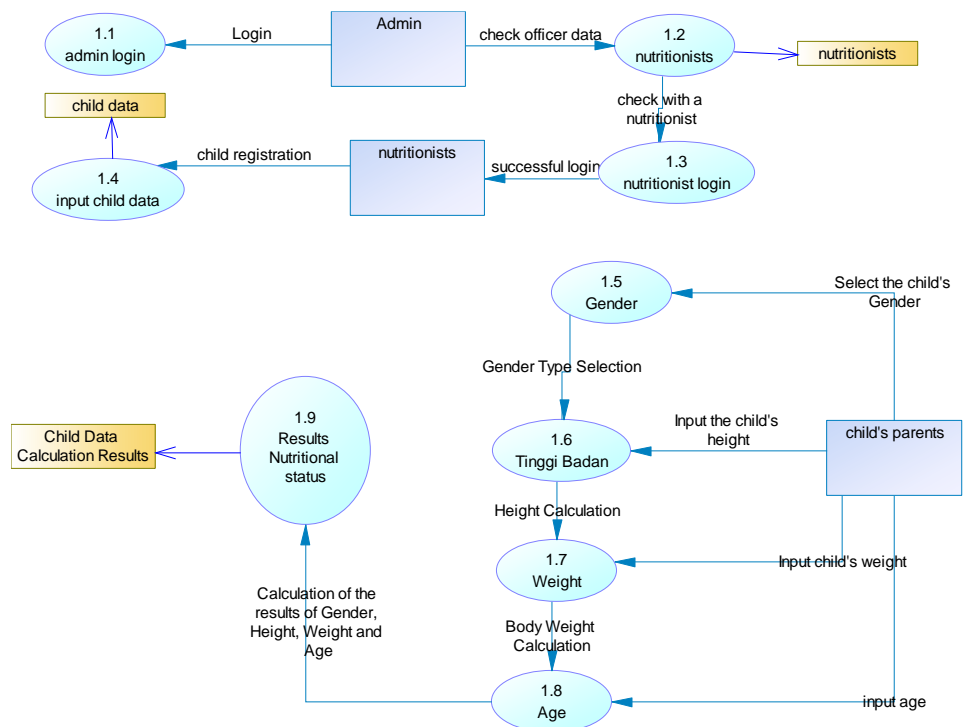

Figure 4. Data Flow Diagram

After designing the context diagram, the next process is designing the data flow diagram where in the image above you can see there are 3 entities, 9 processes and 3 tables. So that the entire application process can be explained where the admin has access to add nutritionist data and system development. Furthermore, nutritionists have access to input patient data according to application requirements, namely gender, height, weight and age. This input will produce information about the patient's nutritional status.
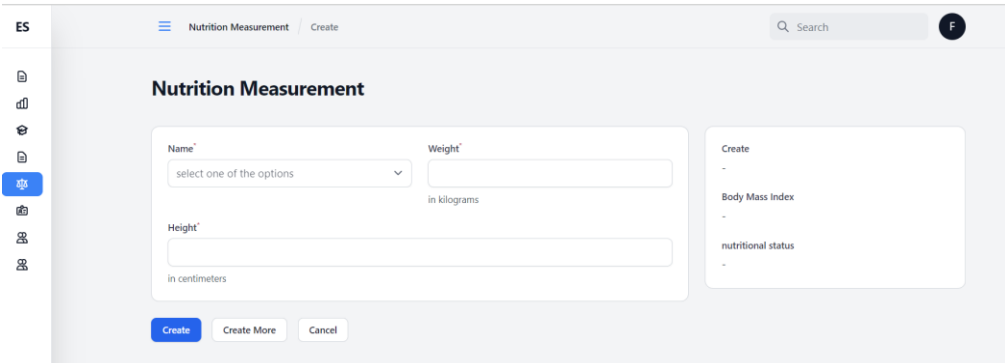
3.4 Implementation System

This stage is the final stage where the system will be tested by assessing the function of the modules in the child nutritional status system.

Figure 5. Login Page

The image above is one of the facilities for logging into the system, which functions as data security. Each user only has one ID and password so that the security level is more effective and efficient.

Figure 6. Nutritional measurement menu display

The image above is the main facility in the system regarding measuring nutritional status based on the weight and height of children aged 0-60 months according to anthropometric standards. Nutritionists are given convenience in the system where the system already provides text boxes regarding body weight and height. Apart from that, reports automatically appear regarding BMI and nutritional status.

Figure 7. Nutritional status report menu display

This image provides information for nutritionists regarding nutritional status in a certain time period. This information is not only about body mass index but what is entered according to the nutritionist, namely the patient's name, height and weight. The application provides facilities to make it easier for officers to search for data and edit data.

4. Conclusions

This system was created to overcome existing problems in NCC services using technology, with 3 entities, namely admin, child' parents and nutritionist. Apart from that, there are also 3 tables in the system, namely a table of calculation results for child data, nutritionist data and child data. So that this data can be used as information for NCC officers and can help in making reports electronically.

References

[1]   F. Wu *et al.*, "Non-communicable diseases control in China and Japan," *Global. Health*, vol. 13, no. 1, pp. 1–11, 2017, doi: 10.1186/s12992-017-0315-8.

[2]   S. Prinja *et al.*, "Impact assessment and cost-effectiveness of m-health application used by community health workers for maternal, newborn and child health care services in rural Uttar Pradesh, India: A study protocol," *Glob. Health Action*, vol. 9, no. 1, 2016, doi: 10.3402/gha.v9.31473.

[3]   L. J. Cortis, P. R. Ward, R. A. McKinnon, and B. Koczwara, "Integrated care in cancer: What is it, how is it used and where are the gaps? A textual narrative literature synthesis," *Eur. J. Cancer Care (Engl).*, vol. 26, no. 4, pp. 1–17, 2017, doi: 10.1111/ecc.12689.

[4]   R. R. M. Salim, "Pengembangan Sistem Informasi Klinik Berbasis Web," *Semin. Nas. Sist. Inf. Indones.*, pp. 2–4, 2013.

[5]   I. Gunawan, "Evaluasi Sistem Informasi Manajemen Rumah Sakit (SIMRS) RSUD Brebes Dalam Kesiapan Penerapan Sistem Informasi Rumah Sakit (SIRS) Online Kemenkes Ri Tahun 2013," pp. 1–15, 2013.

[6]   World Health Organization, "Management of patient information," *Glob. Obs. eHealth Ser.*, vol. 6, p. 80, 2012.

[7]   P. Balaraman and K. Kosalram, "E – Hospital Management & Hospital Information Systems – Changing Trends," *Int. J. Inf. Eng. Electron. Bus.*, vol. 5, no. 1, pp. 50–58, 2013.

[8]   X. Zeng, "The Impacts of Electronic Health Record Implementation on the Health Care Workforce," *N. C. Med. J.*, vol. 77, no. 2, pp. 112–114, 2016.

[9]   D. R. P. Mudiono, S. Hernawati, and S. Bukhori, "Dampak Kualitas Sistem , Pengguna Sistem dan Organisasi dalam Pemanfaatan Kinerja Sistem Informasi Manajemen Rumah Sakit di RSU Dr . H . Koesnadi Bondowoso (Impact of System Quality , System Users and Organization in Utilization of Hospital Information Ma," *Multidiscip. J.*, vol. 589, no. 1, pp. 25–29, 2018.

[10]   D. R. P. Mudiono, I. Muflihatin, and A. P. Wicaksono, "Sosialisasi Penggunaan Aplikasi Pemantauan Kasus Stunting di Desa Kemuning Lor Kabupaten Jember," *J. Community Dev.*, vol. 3, no. 3, pp. 311–317, 2023, doi: 10.47134/comdev.v3i3.118.

[11]   M. C. Roziqin, D. R. P. Mudiono, and N. Amalia, "Analisis Penerimaan Simpus Ditinjau dari Persepsi Pengguna di Puskesmas Mojoagung dengan Metode TAM. Jurnal Teknologi Informasi dan Ilmu Komputer, 8(1).," *J. Teknol. Inf. dan Ilmu Komput.*, vol. 8, no. 1, pp. 47–54, 2021, doi: 10.25126/jtiik.202182907.

[12]   Kementerian Kesehatan RI, *Petunjuk Pelaksanaan Surveilans Gizi*. Jakarta: Kementerian Kesehatan RI, 2012.

[13]   Jogiyanto, *Analisa dan Disain Sistem Informasi: Pendekatan terstruktur teori dan praktek aplikasi bisnis*. Yogyakarta: Andi, 2010.

[14]   E. Nugroho, *Sistem Informasi Manajemen Konsep, Aplikasi, dan Perkembangannya*. Yogyakarta: Andi, 2008.

[15]   Jogiyanto, *Analisis & Desain Sistem Informasi: Pendekatan Terstruktur Teori dan praktik Aplikasi Bisnis*. Yogyakarta: Andi, 1995.