

IMPLEMENTATION OF CHILDHOOD IMMUNIZATION PROGRAM USING THE WATERFALL METHOD

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Abstract: Medical records are managed according to established standards, creating information that should be properly maintained and stored for easy access when needed. This study is motivated by the fact that the number of immunization patients continues to increase daily, so authorities still need a long time to collect information in their registration systems. It is very long and has a significant impact on the performance of healthcare workers. This study aims to redesign the immunization information system to help manage medical records and maintain the quality of health care services. The design of the developed immunization system may include information on the processing and reporting of immunization data in hospitals to enable medical staff to report results to immunization services quickly and accurately. The research method used in this study is descriptive with a qualitative approach. Data collection was conducted through observations, interviews, and literature review from studies of researchers and practitioners. The system development method adopts the waterfall method. This study's results indicate that technology is an appropriate method to more efficiently support data processing and reporting when valid data are available.

Keywords: immunization; information system; medical record

Abstrak: Rekam medis dikelola sesuai dengan standar yang telah ditetapkan untuk menciptakan informasi yang harus dipelihara dan disimpan dengan baik sehingga informasi tersebut dapat dengan mudah diakses pada saat dibutuhkan. Penelitian ini dilatarbelakangi fakta bahwa petugas masih membutuhkan waktu yang lama untuk mengumpulkan informasi dalam kegiatan pelaporan, karena jumlah pasien yang imunisasi terus bertambah setiap harinya. Waktu yang dibutuhkan cukup lama berpengaruh secara signifikan terhadap kinerja tenaga kesehatan. Tujuan dari penelitian ini adalah mendesain ulang sistem informasi imunisasi untuk membantu pengelolaan pelaporan medis sebagai upaya menjaga kualitas pelayanan kesehatan. Rancangan sistem imunisasi yang dikembangkan dapat mencakup informasi pengolahan dan pelaporan data imunisasi di rumah sakit agar tenaga medis dapat melaporkan hasil secara cepat dan akurat kepada layanan imunisasi. Metode penelitian yang digunakan dalam penelitian ini adalah metode deskriptif dengan pendekatan kualitatif. Pengumpulan data dilakukan melalui observasi, wawancara dan studi literatur hasil penelitian peneliti dan praktisi. Metode pengembangan sistem menggunakan metode waterfall. Hasil penelitian ini menunjukkan bahwa penggunaan teknologi merupakan cara yang cukup untuk mendukung pekerjaan pengolahan data dan pelaporan secara lebih efisien ketika tersedia data yang valid.

Kata kunci: imunisasi; rekam medis; sistem informasi

INTRODUCTION

Advances in information technology have become essential for decision-making in work life. One reason is the need for fast, accurate, and concise information. Technological developments emphasize all aspects of digitization[1].

One of them is a health facility. As health service institutions, hospitals must implement a Hospital Management Information System (SIMRS) and organize patient medical records electronically[2]. According to the Decree of the Minister of Health of the Republic of Indonesia No. 24 of 2022, all health services must use electronic medical records by the principles of information security and confidentiality[3].

Health information is the basis of health services. The medical record embodies written medical secrets, including patient identity, examination, treatment, actions, and other services provided to patients [4]. The medical history begins with patient registration, after which the polyclinic doctor records clinical data with several data systems, including data collection, processing, analysis, storage, data display, and transmission. Health information is evidence of the quality of health services as an asset to achieve efficient service[5].

The hospital reporting system is part of the hospital information system. Various information is needed to implement this reporting system. Immunization reporting is one of the reviews that is routinely reported. According to government regulations, every health service provider providing immunization must report regularly and periodically to the district and city health offices[6].

Immunization is given as a liquid vaccine process that can stimulate the

production of antibodies so that the body's resistance to disease increases actively[7]. Immunization is one of the government's concerns because Indonesia is still a relatively low country in the world of child health. Many children suffer from conditions such as pneumonia, diarrhea, poly, congenital disabilities, and developmental defects such as slow speech and walking[8].

According to Indonesian data, the child mortality rate is still relatively high at 22.32 per 1,000 population in 2021[9]. To build better health for Indonesian children, more effective work is needed to conduct counseling and immunization evenly[10].

Child health efforts in Permenkes number 25 of 2014 stated that every child has the right to live, grow and develop and has the right to protection from existing violence and discrimination. Therefore child health interventions must be carried out in an integrated, comprehensive, and sustainable manner[11].

Immunization administration is not new in the Indonesian health system. Immunization officially started in Indonesia in 1956, and the World Health Organization (WHO) has increased immunization worldwide since 1974[12].

Primary immunization is the foundation for health formation for children under five years. Primary immunization consisting of one dose of BCG, three doses of DPT-HB or DPT-HB-Hib, four doses of poliomyelitis, and one dose of measles can effectively prevent fatal diseases, especially by giving more measles immunization. This is related to the fact that measles is one of the leading causes of death in children[13].

State regulations governing the distribution of primary immunization this does not rule out the possibility of an in-

crease in the number of patients at any time. A database management system and reporting information system are needed to facilitate services. Hospitals need better and more flexible management to develop using the waterfall method. This study created a childhood immunization information system to help manage electronic medical record reporting using the waterfall method[14].

In previous studies, some shortcomings became the benchmark for conducting this study, including incomplete data presentation in recording and reporting forms containing immunization data coverage. Hence, this study expects a complete representation of data to support the required immunization writing [15]. Sponsored by the development of good governance as a series of processes, habits, policies, and hospital rules, as well as the use of innovation and technology, it aims to improve the quality of health services by ensuring the security and confidentiality of patient data digitally as well as reporting on the speed, accuracy, and accuracy of information management[16].

METHOD

This research was conducted at the X Mother and Child Hospital in Bandung with a qualitative descriptive study that analyzed the situation, explained problem-solving with data, and interpreted it. This data collection is done through interviews and observation. The development of this immunization service system follows the waterfall method.

The waterfall method or waterfall approach is a classic model in which the concept of software engineering development emphasizes systematic and se-

quential steps in 4 phases.

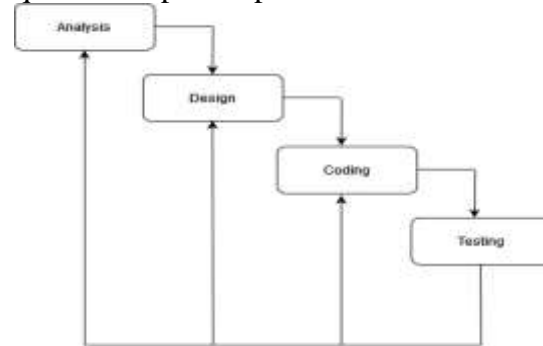


Image 1. Method Waterfall

The steps of the waterfall method include the following:

Analysis

The analysis steps are based on the formulation of the problem, so managers must develop a system that supports the management of medical record reports by focusing on the functions of the system section.

Design

In this phase, system planning is carried out to analyze the needs of the desired system description. This was achieved by designing software user interfaces and system flowcharts, data flow diagrams (DFD), and database modeling processes using relationship diagrams (ERD).

Coding

The coding phase involves writing code to enable the software to perform the desired function using Visual Basic in Microsoft Visual Studio.Net creating menu pages, registration, diagnostics, and immunization reports.

Testing

The system testing phase is about testing the finished application system to determine whether the software follows the standards that will be applied in society[17].

RESULT AND DISCUSSION

The application of information systems in childhood immunization services is a more efficient place to collect patient data by producing systematic information. The purpose of using this information system is to speed up patient services so that the data collection needed for reporting both hospital and government reporting can sprint without missing data.

Menu Page



Image 2. Menu Page

The main menu page is an application platform displaying various system functions. Officers can use all additional functions needed, such as registration, patient information, doctor information, medical information, service information, and reports, with the addition of a logout button if they want to exit the application.

Doctors Data Page



Image 3. Doctors Data Page

The doctor data page is used to view doctor information registered in the system, with the ability to add doctor information not written to the design and an edit function to change existing doctor information. To add doctor information, you need a doctor's ID, doctor's name, gender, telephone number, address, and type of doctor's specialist.

Officer Data Page



Image 4. Officer Data Page

The purpose of the officer data page is to display information on officers registered in the system. The feature function adds data for adding data for officers who are not written in the system, and the editing function is for changing existing data. Additional officer information requires an officer's ID, name, gender, date of birth, and address.

Outpatient Admission System

The outpatient registration point (TPPRJ) is essential to hospital services because it is the first point of contact between patients and officers. Therefore, the quality of services provided by TPPRJ is a reference for patients in assessing the quality of service. The registration system is essential for giving fast and accurate reports because patient data is first processed at the registration point.

Registration activities are in the form of filling in patient identity and patient social information. The personal data must at least contain patient information, patient name, and a master number (NIK). Social information should include at least religion, occupation, education, and marital status.



Image 5. Patient Registration Form

Patient Naming System

The patient naming system is used as an identity to distinguish one patient from another. Fill in the patient's name entirely, or at least two syllables, with the patient's first name, the husband's name if married, and the father's name if unmarried, or use the surname first, followed by the patient's name.

Patient Numbering System

Each new patient receives a medical record that is used at each visit. The numbering system uses a unit numbering system (UNS), where patients only receive one number that combines all data results, both outpatient and inpatient and in the emergency room. In this way, patient data is stored in the same database when the officer records the patient's identity entirely and correctly. The information is processed into an electronic patient file.



Image 6. Childhood Immunization Schedule

Electronic Medical Record Information Distribution

Medical record information created at TPPRJ is sent from one unit to another. TPPRJ distribution is carried out by sending the data to selected polyclinics to get health services.

Filling in Clinical Information

Polyclinic officers fill out the service form with clinical information about the results of examinations, actions, and health services on patients.



Image 7. Patient Care Form

Medical Record Information Processing

Medical record coding is the determination of diagnosis and medical action codes in the form of letters, numbers, or combinations of letters and numbers following ICD-10 for diagnosis and ICD-9-CM for action codes.

the patient's last visit. Electronic patient data must be stored in a specific way to ensure security, confidentiality, availability, and integrity.

Efforts to Implement Medical Record Reporting Governance

Governance is an effort to improve the quality of service by creating an excellent clinical service environment for implementing health services. One of the systems applied in the implementation is clinical efficiency, namely the provision of health services that ensure the best performance and productivity with evidence of their effectiveness.

Efforts in implementing governance can provide the following benefits: Safe prevents unexpected events, such as service fraud, by giving patient-centered services with empathy, responsibility, and clinical ethics. Punctuality can reduce patient waiting times for efficient and effective services, supported by officers with knowledge and skills. Fair, i.e., no distinction is made between economic, social, racial, religious, or ethnic status.

Governance can be used as an assessment tool for quality medical delivery and avoiding unnecessary activities.

CONCLUSION

This study concludes that hospitals can produce information more efficiently regarding data storage and processing. Implementing good governance based on applicable laws can be the foundation of health services by using management information systems as support. Information systems can make it easier for officers to process information because it is appropriately handled with

out many formulas and rules in hospital information systems so that the necessary data are reported quickly and accurately.

BIBLIOGRAPHY

- [1] H. Kurniawan, W. Apriliah, I. Kurniawan, And D. Firmansyah, "Penerapan Metode Waterfall Dalam Perancangan Sistem Informasi Penggajian Pada Smk Bina Karya Karawang," *Jurnal Interkom: Jurnal Publikasi Ilmiah Bidang Teknologi Informasi Dan Komunikasi*, Vol. 14, No. 4, Pp. 13–23, Jan. 2020, Doi: 10.35969/Interkom.V14i4.58.
- [2] L. Penelitian, D. Pegabdian, S. Dharma, L. Padang, T. Wulandari, And D. M. Putra, "Study Literature Review Tentang Implementasi Simrs Pada Unit Kerja Rekam Medis Rawat Jalan Dengan Metode Hot-Hit," *Administration & Health Information Of Journal*, Vol. 1, No. 2, 2020, [Online]. Available: [Http://Ojs.Stikeslanbouw.Ac.Id/Index.Php/Ahi](http://Ojs.Stikeslanbouw.Ac.Id/Index.Php/Ahi)
- [3] "Peraturan Menteri Kesehatan Republik Indonesia Nomor 24 Tahun 2022 Tentang Rekam Medis."
- [4] Y. Y. Wijaya, E. Suyanto, And F. Tanuwijaya, "Rekam Medis: Penggunaan Informasi Medis Pasien Dalam Pelaksanaan Asas Perlindungan Publik," *Veritas Et Justitia*, Vol. 6, No. 2, Pp. 399–423, Dec. 2020, Doi: 10.25123/Vej.3717.
- [5] D. U. Oktaviana And E. Gunawan, "Perancangan Sistem Informasi Imunisasi Di Poliklinik Anak Rs Bhayangkara Tk I Pusdokkes Polri," *Comserva: (Jurnal Penelitian*

- Dan Pengabdian Masyarakat*), Vol. 2, No. 07, Pp. 1156–1172, Nov. 2022, Doi: 10.36418/Comserva.V2i07.461.
- [6] E. D. Lestari And P. D. Susanti, “Perancangan Sistem Informasi Pelayanan Imunisasi Bayi Di Puskesmas Sawah Lebar Bengkulu,” *Jurnal Infokes*, Vol. 5, No. 2, Pp. 15–19, Dec. 2021.
- [7] S. Yunilia And A. Persada Putera, “Tanggung Jawab Hukum Bidan Praktik Mandiri Terhadap Penyimpanan Vaksin Imunisasi Anak,” *Jurnal Ilmu Hukum*, Vol. 6, No. 1, P. 235, 2019, Doi: 10.30596/Delegalata.V6i1.5013.
- [8] L. Akhmad Tiu And A. Zainuddin, “Analisis Faktor Yang Berhubungan Dengan Imunisasi Dasar Lengkap Pada Masa Pandemi Covid-19 Di Puskesmas Kulisu,” 2022. [Online]. Available: <https://stikes-nhm.e-journal.id/obj/index>
- [9] S. Widi, “Angka Kematian Anak Di Indonesia Terus Turun Pada 2021,” *Data Indonesia*, Nov. 20, 2022. <https://dataindonesia.id/ragam/detail/angka-kematian-anak-di-indonesia-terus-turun-pada-2021> (Accessed Apr. 26, 2023).
- [10] S. Kasus Imunisasi Di Puskesmas Gunung Sindur *Et Al.*, “Sistem Informasi Pelaporan Pws Kia Berbasis Web Web Based Pws Reporting Information System Case Study Of Immunization At Gunung Sindur Health Center,” 2018.
- [11] “Peraturan Menteri Kesehatan Republik Indonesia Nomor 25 Tahun 2014.”
- [12] P. Sari *Et Al.*, “Faktor Yang Berhubungan Dengan Pemberian Imunisasi Dasar Pada Bayi Di Wilayah Kerja Puskesmas Paal X Kota Jambi Factors Related To The Provision Of Basic Immunization To Infants In The Work Area Of The Paal X Health Center Jambi City,” *Jkmj*, 2022.
- [13] C. Amadea Wibowo *Et Al.*, “Pengetahuan Dan Sikap Ibu Tentang Imunisasi Dasar Pada Balita,” 2020.
- [14] A. D. Tristantia, “Evaluasi Sistem Pelaporan Insiden Keselamatan Pasien Di Rumah Sakit,” *Jurnal Administrasi Kesehatan Indonesia*, Vol. 6, No. 2, P. 83, Dec. 2018, Doi: 10.20473/Jaki.V6i2.2018.83-94.
- [15] D. Damayanti, D. Yulistiyanti, J. Raya Tengah No, K. Gedong, P. Rebo, And J. Timur, “Perancangan Sistem Pendataan Imunisasi Pasa Posyandu Wijaya Kusuma,” 2022.
- [16] R. Kurniawan, E. U. Artha, And F. M. Wibowo, “Sistem Informasi Vaksinasi Pada Balita Menggunakan Metode Waterfall,” *Jurnal Komtika (Komputasi Dan Informatika)*, Vol. 3, No. 1, Pp. 34–39, Apr. 2020, Doi: 10.31603/Komtika.V3i1.3468.
- [17] R. Salsabila, R. S. Khoirunnisa, Y. Syahidin, And I. Sari, “Perancangan Sistem Informasi Retensi Rekam Medis Pasien Rawat Jalan Menggunakan Visual Studio 2010,” *Jurteksi (Jurnal Teknologi Dan Sistem Informasi)*, Vol. 8, No. 1, Pp. 27–34, Dec. 2021, Doi: 10.33330/Jurteksi.V8i1.1209.