

## Information Technology-Based Medical Record Governance for Cancer Classification with The Waterfall Method

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### Article Information

#### Article history:

No. 712

Rec. April 13, 2023

Rev. February 15, 2024

Acc. February 20, 2024

Pub. February 25, 2024

Page. 271 – 285

#### Keywords:

- Information technology
- Medical record governance
- Visual basic
- Cancer classification
- Waterfall method

### ABSTRACT

Information technology can help improve the quality of medical record management. Information technology-based medical record management can help improve the efficiency, accuracy and accessibility of medical records. The aim of this research is to build an information technology-based medical record management system for cancer classification using the waterfall method. This research uses a system development research method using the waterfall method. The data collection techniques used were observation, interviews and literature study. The data that has been collected is then analyzed qualitatively. The research results show that an information system designed specifically for patients who register directly makes it easier for officers to separate patients who register online from those who register in person. This system allows officers to report information quickly and accurately, and to be better integrated in quality improvement and hospital accreditation.

#### How to Cite:

Rahmawati, R. L., Abdussalaam, F., & Sari, I. (2024). Information Technology-Based Medical Record Governance for Cancer Classification with The Waterfall Method. *Jurnal Teknologi Informasi Dan Pendidikan*, 17(1), 271-285. <https://doi.org/10.24036/jtip.v17i1.712>

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## 1. INTRODUCTION

The development of technology and information in today's world is very rapid, where everything will be related to technology and information. Information technology will continue to develop rapidly from time to time [1],[2]. The presence of information technology aims to facilitate work more efficiently, effectively, and transparently [3],[4]. The impact of the application of advances in information technology is very large [5], one of which is the application of technology at home to optimize the performance of gas for ease

of service and guarantee comfort for patients. With the speed of information systems, every instance is led to a switch from a human system to a computer system. Health facilities such as hospitals

PERMENKES Number 24 of 2022 concerning Medical Records. This regulation repeals the Regulation of the Minister of Health of the Republic of Indonesia Number 269/MENKES/PER/III/2008 of 2008 about Medical Records. Several things underlie the revocation of the Regulation of the Minister of Health, including Regulation of the Minister of Health of the Republic of Indonesia: number 269 / MENKES / PER / III / 2008 the Year 2008 is no longer following the development of science and technology, the needs of health services, and the legal needs of society; the development of digital technology in society has resulted in the transformation of digitalization of health services; Electronic medical records must prioritize the principles of security and confidentiality of data and information." [6]. With the development of information technology, it is expected that medical records and health information can classify diagnoses electronically according to the ICD-10 coding [7]. One of the implementations of information technology is the application of a computerized system that is expected to speed up and facilitate the work of officers in the process of identifying the correct disease code.

Medical record management is very important in medical services today [8]. The medical records officer is the unit most responsible for the collection, processing, and reporting of accurate patient data.

During the research at the hospital, especially cancer installation, it was not only outpatient, there was also inpatient care, because there were also many patients who had to do chemotherapy and other procedures that required hospitalization [9]. All reporting registration was still done manually, this became an idea and an innovation for make an application that makes work easier. things to think about are not only about diagnosis but each patient is very diverse using payment methods, for example Bpjs, Insurance, Jamkesmas and so on, this is also considered and will be integrated in this Cancer application [10] Management of medical records is very important for health service facilities [11]. The medical record management unit is very important and responsible for collecting patient files such as diagnosis to payment as well as data management and accurate data reporting. This is a solution for the medical record unit to support the quality of hospital services to be more complete [12]. Data from Global Cancer Statistics (GLOBOCAN) shows that in 2020 there will be 19.3 million new cases of cancer, and 10 million cases of death from cancer. In 2040, there will be a global increase of 47% of new cancer cases, to 28.4 million new cancer cases. This means that every hospital must pay more attention to accurate reporting so that new cancer cases do not occur.

The reporting officer said that the highest number of cancer patients at this hospital was breast cancer. Breast cancer is a malignancy that starts from cells in the breast that line the ducts (ductal cancer). Some cases start in the lobules (lobular cancer) and a small number start in other tissues. Malignant cancer cells can originate or grow from any type of cell in

the human body. The incidence of breast cancer is still very high, in 2015 there were 737 cases (63%) and in 2016 there were 70 cases (17%) in Al-Ihsan Hospital, Java Province West. One of the treatments for breast cancer is chemotherapy in the form of giving anti-cancer drugs in the form of fluids through an infusion. The highest number of reports every year is breast cancer.

There are several ways to treat this cancer, namely chemotherapy and infusion of drugs in liquid form [13],[14]. You can also use X-rays and Gamma-ray masekatomies, namely in the form of surgery to remove breast cancer cells, which is called surgery to change the environment for cancer so that the cells will die.

Because every cancer in the hospital needs to be reported every year, and because this hospital is still manual, a desktop application will be made To assist officers in making daily, monthly, and annual reports easier, and can also do the most disease reports in their respective years and improve registration in the data collection process using an application that has been designed and officers can directly do reporting, analyzing and re-ported using Visual Basic.

## 2. RESEARCH METHOD

This research uses a system development research method using the waterfall method. The Waterfall model is a classic and systematic form of system development that is built sequentially [15]-[17]. The Waterfall Model is a work character model in the SDLC process, where each phase of the waterfall must be completed before proceeding to the next phase [18]-[20]. The data collection techniques used were observation, interviews and literature study. First, observations were carried out at Al Ihsan Hospital to examine in depth the existing system, identify deficiencies, draw temporary conclusions on existing problems, and identify future improvements. Second, a question and answer interview was conducted with officers to obtain complete information regarding all related activities at Al Ihsan Hospital. Third, library research was carried out through book and internet references. The system development method used in this research follows the System Development Life Cycle (SDLC) pattern which includes planning, analysis, design, implementation, testing and management stages. The data that has been collected is then analyzed qualitatively.

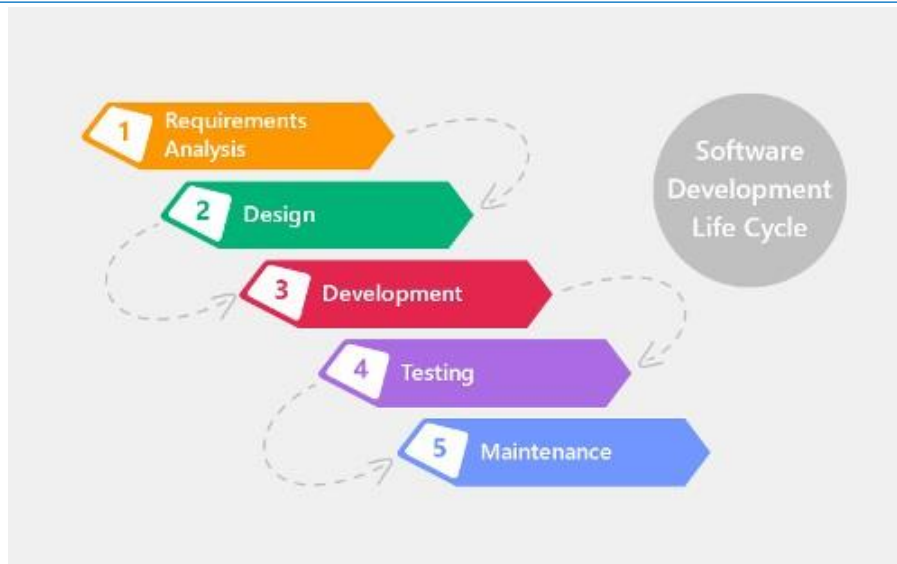


Figure 1. Waterfall Method

The next steps are carried out in the waterfall method, including:

1. Requirements Analysis and Definition  
The system's services, constraints, and objectives are set in consultation with system users. Then it is defined in detail and serves as a system specification.
2. System and Software Design  
The system design process of allocating requires system hardware or software by forming the overall system architecture. Software design involves identifying and illustrating the abstraction of the software system.
3. Implementation and Unit Testing  
At the current stage, a mobile device is a group of programs or program units. Unit testing involves verifying that each unit meets its specifications.
4. Integration and System Testing  
Individual program units or programs are integrated and tested as a complete system to ensure that software requirements are met. After system testing, the software is delivered to the customer.
5. Operation and Maintenance (though not always)  
It is the longest phase, the system is installed and put into practical use.

Regarding software development methods. This method is taken because the Waterfall method is more detailed and also arranged so that in the development stage it becomes structured and planned, the quality presented from the resulting system will be good because it is not focused on other stages so that development System becomes integrated where each stage is completed completely before proceeding to the next stage.

### 3. RESULTS AND DISCUSSION

In this study, the author can understand the implementation of the cancer disease index of medical records. The implementation of the Cancer Disease Index Medical Records was conducted at RSUD AL-IHSAN, and it involved recording the disease diagnosis on a form sheet. The process of applying the disease index began with patient registration in the registration section and continued until the patient was admitted to the section. Once the patient entered the hospital, the doctor wrote the patient's diagnosis in the medical record. If the inpatient treatment was completed that day, the patient's data were submitted to the medical record the next day for compiling and coding the disease. The coded disease was then recorded in the medical record.

The Cancer disease coding process involves the coder receiving a medical record from the room that contains the patient's identity, diagnosis, and actions. The coder officer only pays attention to the diagnosis of hospitalized patients, and then enters the diagnosis code in the ICD-X code column based on the diagnosis code on ICD-X. If the patient's diagnosis is illegible and does not comply with ICD-X, the coder asks the doctor immediately regarding whether the diagnosis is following the patient's medical record.

The hospital faces several problems regarding the implementation of the Cancer Disease Index Medical Records. Firstly, there is no computerized index application which has resulted in a suboptimal index recording process. This means that the process of making disease index reports has not been computerized as well. As a consequence, there are no monthly and annual disease index reports on the part of the Head of Installation. These issues can hinder the hospital's ability to manage cancer cases effectively and efficiently. It is important for the hospital to address these problems in order to ensure that their patients receive the best possible care.

The main research objective of implementing the Cancer Disease Index Medical Records system is to improve the hospital's disease index reporting process. By utilizing a disease index data system, the hospital aims to facilitate the creation of disease index reports and accelerate the process of making them every month. This will not only benefit the hospital's internal management but also contribute to the improvement of cancer patient care. With more accurate and timely disease index reports, the hospital will be able to identify trends and patterns in cancer diagnoses, which can lead to better treatment options and outcomes for their patients. The implementation of this system will ultimately help the hospital to provide better care and services to cancer patients.

The Design Made system is a system designed to create a pen-index system for Yaki Hospital. The system aims to facilitate the archiving and retrieval of patient medical record data using pen-shaped indexes. With this system, medical staff can easily find the desired patient data by simply searching for the index number listed on the pen. The system will

also allow for more effective and efficient patient data recording, as well as minimizing the possibility of recording errors or data loss. With the implementation of this Design Made system, it is hoped that Yaki Hospital can improve the quality of healthcare services and provide better and faster patient treatment. Here is the Design Made system in Yaki Hospital:

### 3.1. Flow map

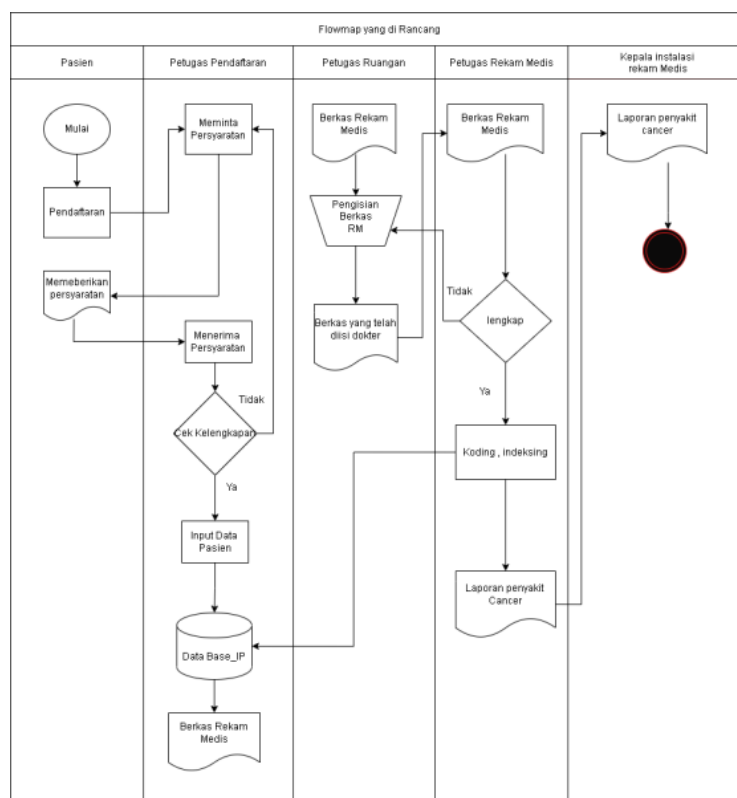


Figure 2. Flow map

Health Care 2, or other hospital referrals after the patient provides the requirements, the patient's file will be checked for completeness if it is complete, the patient's data will be directly inputted, otherwise the patient must fill in the incomplete requirements first After the patient data is complete, the officer will save the patient data into the patient database, then the registration officer will hand over the medical record data to the room staff, this data will be completed after being examined by the nurse or the doctor after being filled in by the correctional officer, then handed over to the person in charge of the medical record to carry out a complete analysis of the medical record data, if there are parts that are not complete, then the file will be returned to fill in incomplete data, if the file is complete, the person in charge of the medical record will write the diagnosis code and disease index, then

the officer will make an examination form and report cancer every day, month, year and then submit the report to the head of the hospital medical record installation.

### 3.2. Context Diagram

The context diagram in the study is that there are 3 entities connected to the disease index information system consisting of input data flows, patient data input, doctor data, visits, diagnosis data, index data, and cancer and cancer disease index reports. Jungun per day, per month, per year. There are outside entities such as the Head of Medical Record installation.

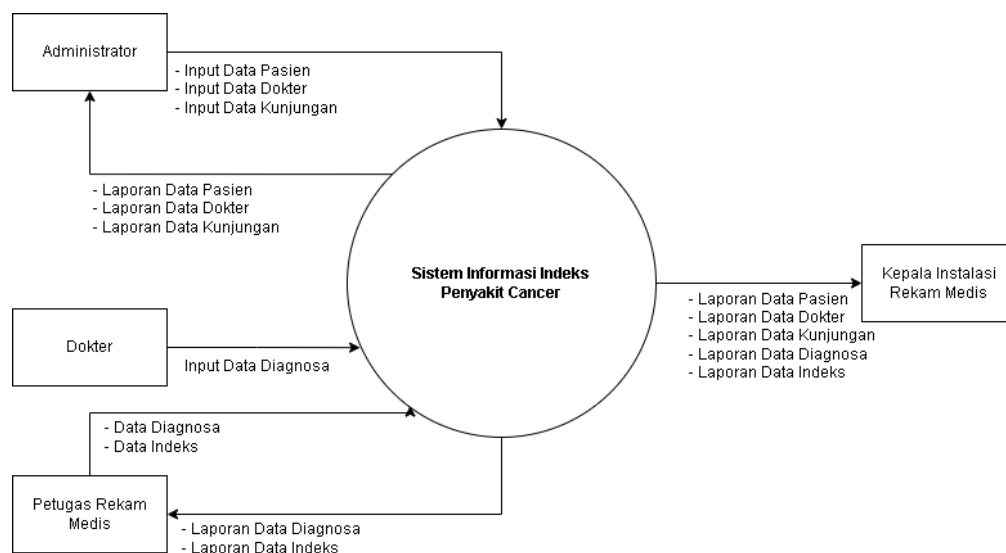


Figure 3. Context Diagram

### 3.3. Data Flow Diagram (DFD) Level 0 In this image basically

Just start the input until the output as shown in figure 4. It can be seen that the initial input in the registration process by filling in patient data and ending with the output of the cancer disease index report and visits per day, per month, and year.

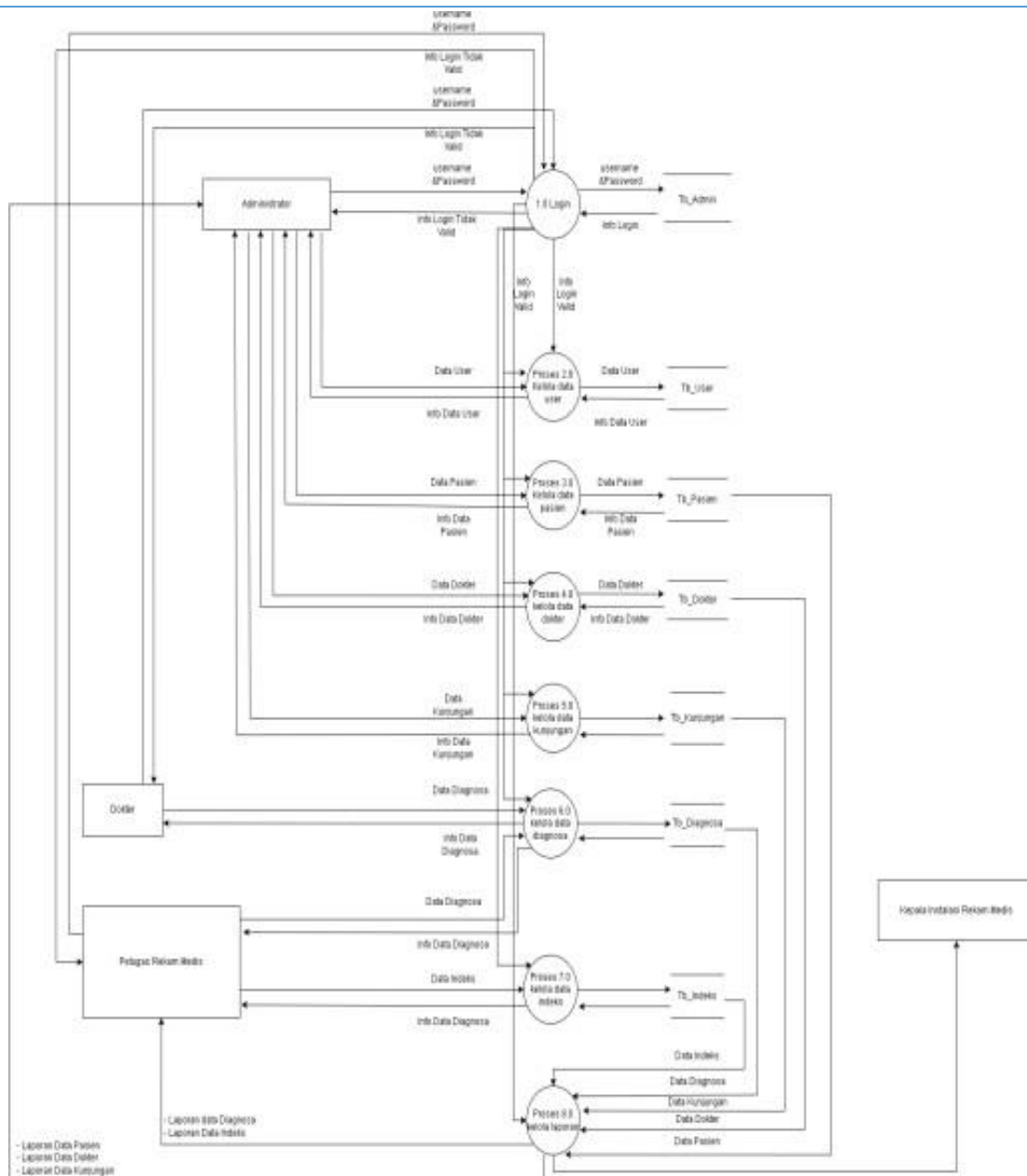


Figure 4. DFD Level 0

### 3.4. Entity Relationship Diagram (ERD)

It is a network that uses data structures and is stored in absurd arrays to interpret between data and related data objects underlying relationships described by attributes that describe all the truths of the system.



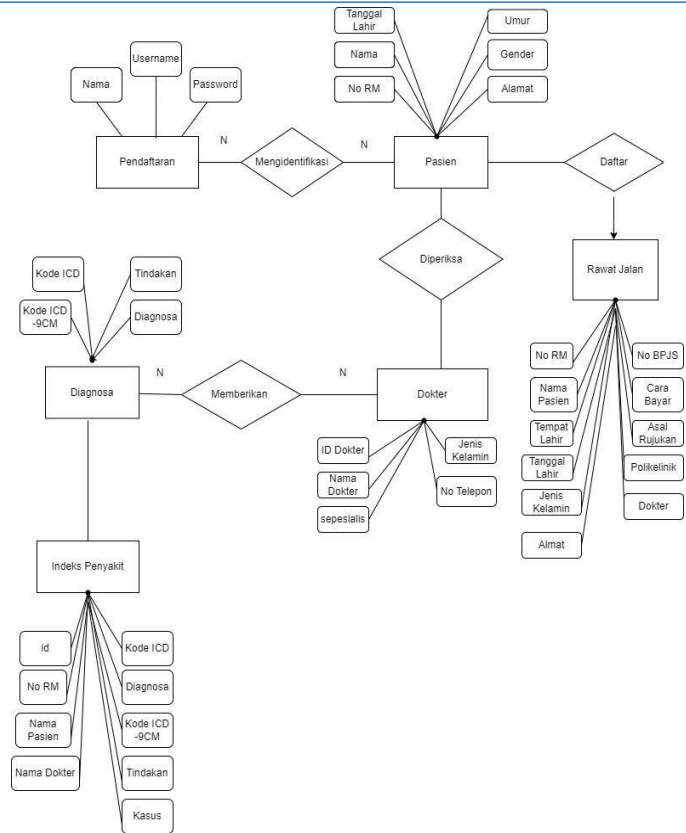


Figure 5. Entity Relationship Diagram (ERD)

### 3.5. Login Page

The login page is the main page of this application, the officer must log in first on this form must enter the username and password that have previously been created

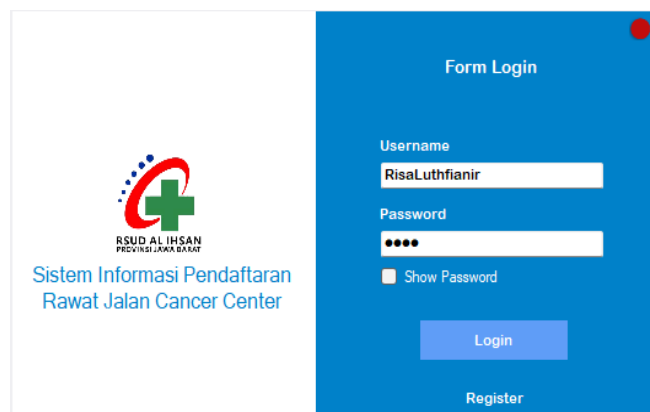


Figure 6. Login Page

### 3.6. Main Menu Page

After logging in, the system will display the main menu which displays several registration menus such as Cancer Center, patient data, doctor data, diagnosis data, index data, and visit reports along with the index Cancer patients.



Figure 7. Main Menu Page

### 3.7. Patient Form Page

In this patient form, there are patient data regarding the patient's identity, in this form the officer can add, even patient data, and officers can see new patients and other patients.

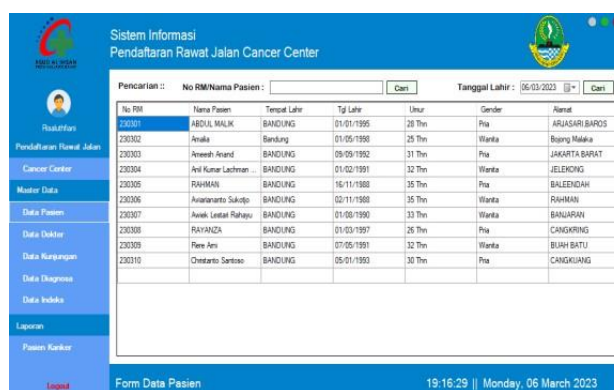


Figure 8. Patient Form Page

### 3.8. Doctor Form Page

This doctor form contains a form that must be filled out for doctor data collection. The aim is that officers know the list of names of doctors who are registered in this application.

**Sistem Informasi Pendaftaran Rawat Jalan Cancer Center**

Id Dokter:

Nama Dokter:

Jenis Kelamin:

No Telepon:

Spesialis:

ID	Nama	Gender	No Telepon	Spesialis
88007	Dr. Felicia Pilar Gunasentini, Sp.Rad	Wanita	08522676123	Radologi
02002	Dr. Tarko Rikman, Sp.OG	Pria	029667093	Bedah Onkologi
02003	Dr. Dewa Rihandi, Sp. PA	Wanita	087778888	Patologi Anatomi
02004	Dr. Fandi Adam, Sp.Ch.Rad	Pria	08156278854	Radologi
02005	Dr. Riva Melek, Sp. PA	Wanita	08732486790	Patologi Klinik

Form Data Dokter 19:17:23 | Monday, 06 March 2023

Figure 9. Doctor Form Page

### 3.9. Visit Form Page

In this visit form, officers can see patient data and can search for patient data by inputting the Rm Number or Patient Name and date of birth.

**Sistem Informasi Pendaftaran Rawat Jalan Cancer Center**

Pencarian: No RM>Nama Pasien:  Cari Tanggal Kunjungan: 06/03/2023 Cari

No Register	Tgl Sambut	Jam	No RM	Nama Pasien	Tempat Lahir	Tgl Lahir	Umur	Gender	Ras
RJ001	06-03-2023	17.46	23001	ABDUL MALIK	BANDUNG	01-01-1999	28 Th	Pria	AFRIKAN/BAFOS
RJ002	06-03-2023	18.42	23002	Helela	BANDUNG	01-05-1996	26 Th	Wanita	Betung Melayu
RJ003	06-03-2023	19.49	23003	Aneesh Anand	BANDUNG	09-09-1992	31 Th	Pria	JAKARTA BARAT
RJ004	06-03-2023	18.52	23004	Ardi Nurul Lachman Feryadi	BANDUNG	01-02-1991	32 Th	Wanita	JELEBONG
RJ005	06-03-2023	18.56	23005	RAHMANN	BANDUNG	16-11-1988	35 Th	Pria	BALEENDAH
RJ006	06-03-2023	18.97	23006	Aquawaruna Sabahlo	BANDUNG	02-11-1988	35 Th	Wanita	RAJAHMUNI
RJ007	06-03-2023	19.00	23007	Aweh Lestari Rehaer	BANDUNG	01-08-1990	33 Th	Wanita	BANJARAN
RJ008	06-03-2023	19.01	23008	RAYANCA	BANDUNG	01-03-1997	26 Th	Pria	CANGKRING
RJ009	06-03-2023	19.02	23009	Ree Aes	BANDUNG	01-05-1991	32 Th	Wanita	BUAH BATU
RJ010	06-03-2023	19.04	23010	Cherwineto Sentosa	BANDUNG	06-01-1993	30 Th	Pria	CANGKILANG

Form Data Kunjungan 19:18:22 | Monday, 06 March 2023

Figure 10. Visit Form Page

### 3.10. Diagnosis Form Page

In this diagnosis form, officers can input diagnoses along with ICD 9, and ICD 10 codes, and also officers can input actions.

**Sistem Informasi Pendaftaran Rawat Jalan Cancer Center**

Kode ICD :  Kode ICD-9CM :

Diagnosa :  Tindakan :

Kode ICD	Diagnosa	Kode ICD	Tindakan
C50	Carcinoma mammae	J700	Apendektomi
C69	Tumor ganas ovarium	99.25	Chemotherapy
C70	Tumor Ganas pada p...	08.00	Surveillance
C01.0	Carcinoma colon	79.02	Opf
C03	Tumor Ganas cervix u...	74.09	SC
C08	Tumor Ganas pada p...	06.02	Excise Abcess
C21	Tumor Ganas pada a...	98.05	ESWL
C22	Tumor Ganas liver	83.39	Excise Tumor
C01.3	Carcinoma Rectum		
C13	Tumor ganas pada ha...		
C09	Malignant neoplasm of		

Form Diagnosis 20:30:15 | Monday, 06 March 2023

Figure 11. Visit Form Page

### 3.11. Index Form Page

In this index form, officers can see patient data as a whole from the start of diagnosis and actions that must be done and ICD code 10, and ICD 9 automatically.

The screenshot displays the 'Form Indeks' page. At the top, there are input fields for 'No Register' (RU001), 'No Rekam Medis' (S00301), 'Nama Pasien' (ABDUL MALIK), and 'Dokter' (-Pib-). There are also radio buttons for 'Diagnosa' (Tridakan) and 'Kasus Baru' (Kasus Lama). Below these fields is a table with the following data:

id	No Register	Tgl Kunjungan	No RM	Nama	Dokter	ICD-10	Diagnosa	ICD-9	Tridakan	Kasus
1	RU001	06/03/2023	230301	ABDUL MALIK	-Pib-	C34	Tumor Ganas...			Kasus Baru

Figure 12. Index Form Page

### 3.12. Report Form Page

In this report form, there is patient data per day, per month, and year and officers can make reports as needed from daily, per month, or year and according to the same type of disease. In this form, officers can also print reports as needed.

The screenshot displays the 'Form Laporan' page. It features two main sections: 'Kunjungan' and 'Indeks'. Each section has radio buttons for 'Semua' and 'Per Tanggal' (with a date picker set to 06/03/2023), and 'Per Bulan/Tahun' (with year and month pickers). There are 'Preview' buttons for each section.

Figure 13. Report Form Page

### 3.13. Report Results Page Visit with Report Officer can create

Fast and accurate reports This designed application can create reports per month, per week, and per year of these 14 figures of the results of the entire Cancer patient visit.

No Register	Tanggal Kunjungan	No RM	Nama Pasien	Tempat Lahir	Tgl Lahir	Usia	Gender	Alamat	Cara Bayar	No BPJS	Asal	Polio	Dokter	Kat
R1001	06/03/2023	11748	ABDUL MULK	BANDUNG	01/01/1999	25 Thn	Pria	ARJASARI	BPJS	0002	4507	Faek	Radiat	Patn
R1002	06/03/2023	11842	Amalia	Bandung	01/09/1998	25 Thn	Wanita	Bogong Marika	BPJS	00012	34445	Faek	Radiat	Dr. Herat
R1003	06/03/2023	11849	Arwah Arwah	BANDUNG	08/09/1992	31 Thn	Pria	JAGANDA BARAT	UMUM			Faek	Herat	Dr. Herat
R1004	06/03/2023	11852	Ani Kurnia Lachman Purdita	BANDUNG	01/02/1991	32 Thn	Wanita	JELEKONG	Assus			Faek	Herat	Dr. Herat
R1005	06/03/2023	11858	RAHMATI	BANDUNG	18/11/1996	25 Thn	Pria	SALEENCA	-Pilih-			-Pilih-	Herat	Dr. Herat
R1006	06/03/2023	11857	Awanaranta Suktopo	BANDUNG	02/11/1996	25 Thn	Wanita	RAHMAN	-Pilih-			-Pilih-	-Pilih-	Kont
R1007	06/03/2023	11900	Aniek Lintang Rahayu	BANDUNG	01/08/1999	23 Thn	Wanita	BANGARAN	UMUM			Faek	Radiat	Dr. Herat
R1008	06/03/2023	11901	RAVANZA	BANDUNG	01/03/1997	26 Thn	Pria	CANGKUR	-Pilih-			-Pilih-	Radiat	Dr. Herat
R1009	06/03/2023	11902	Rara Ari	BANDUNG	07/05/1991	32 Thn	Wanita	BLAH BATU	Assus			Faek	Herat	Dr. Herat
R1010	06/03/2023	11904	Christanto Sembodo	BANDUNG	03/01/1993	30 Thn	Pria	CANGKUA	BPJS	00005		Faek	Herat	Dr. Herat

Figure 14. Kunjungan Report Results Page

### 3.14. The results page of the Yakut Index Report

Just like the report above, officers can make reports quickly and accurately, this designed application can make reports per month, per week, and per year this 15-figure results from the report of the patient's disease index.

No Register	Tanggal Kunjungan	NO RM	Nama Pasien	DPJP	ICD-10	Diagnosa	ICD-9	Tindakan	Kesan
R1001	06/03/2023	23001	ABDUL MULK	-Pilih-	C34	Tumor Ganas pada pa			Kausa Ben
R1002	06/03/2023	23002	Amalia	Dr Faad Adam, SpOnkR	C50	carcinoma mammae	83.39	Excise Tumor	Kausa Ben
R1003	06/03/2023	23003	Arwah Arwah	di Dava Rahmat, Sp. PK	C69	Maligne neoplasm of 47.39		Apandectomy	Kausa Ben
R1004	06/03/2023	23004	Ani Kurnia Lachman P	Dr Faad Adam, SpOnkR	C34	Tumor Ganas pada pa			Kausa Ben
R1005	06/03/2023	23005	RAHMATI	di Rina Wati, Sp. PK	C69	Maligne neoplasm of 86.02		Excise Abscess	Kausa Ben
R1007	06/03/2023	23007	Aniek Lintang Rahayu	di Taufik Rahmat, SpOG	C50	carcinoma mammae	79.02	Def	Kausa Ben
R1008	06/03/2023	23008	RAVANZA	di Dava Rahmat, Sp. PK	C69	Tumor Ganas pada pa	83.39	Excise Tumor	Kausa Ben
R1010	06/03/2023	23010	Christanto Sembodo	di Taufik Rahmat, SpOG	D14.1	Carcinoma coloni	83.39	Excise Tumor	Kausa Ben

Figure 15. Disease Index Report Results Page

## 4. CONCLUSION

The existence of an information system designed specifically for patients who register directly has led to several conclusions. Firstly, it has made it easier for officers to separate patients who register online from those who register in person. Secondly, officers can input, manage, and produce data, and make reports on visits and disease indices according to the desired period, such as per day, per month, and per year, or reports according to the same disease. The Cancer patient data has already been successfully

inputted into the system, and can now be processed for data collection that is then stored. This system allows officers to make information reporting quickly and accurately, and it also becomes more well-integrated in improving the quality and accreditation of hospitals. The system's output includes the ability to display the results of reports processed by officers, which can be printed and sent to the head of the medical record installation.

The results of this research confirm that the use of information technology in medical record management has the potential to facilitate the cancer classification process by utilizing the Waterfall method, this system can be implemented in a more structured and planned manner, thus enabling better data management. In addition, this research shows that the application of information technology in medical record management can increase the efficiency and effectiveness of health services with a computerized system, patient data can be accessed more quickly and accurately, allowing medical personnel to provide more appropriate care and at the right time. to the patient.

### REFERENCES

- [1] F. Hikma, S. Farlinda, and M. A. Kurniawan, "Sistem Informasi Peminjaman dan Pengembalian Berkas Rekam Medis Rumah Sakit Umum Daerah dr. Soebandi Jember," *SEMNASKIT 2015*, 2018.
- [2] V. E. Afdhal, W. Wulandari, and W. Marta, "Visual Communication in the Design of the "Fathiyah" Application as a Learning Media for Hijaiyah Letters in the COVID-19 Period," *Jurnal Teknologi Informasi dan Pendidikan*, vol. 14, no. 1, pp. 64–72, 2021.
- [3] S. H. Syarafah and S. Riyanto, "E-Government Strategy as the Implementation of Good Corporate Governance in the Ministry of Public Works and Public Housing," *Int J Innov Sci Res Technol*, vol. 5, no. 6, pp. 62–69, 2020.
- [4] K. Wulansari and S. Sailawati, "Analysis of Tax Innovation Breakthrough on E-Bphtb System to Minimize Fraud in the Local Revenue Office of Samarinda," *Journal Research of Social, Science, Economics, and Management*, vol. 1, no. 12, pp. 2067–2075, 2022.
- [5] H. Saputra and W. M. Kifti, "Implementation of CRM To Retain and Attract New Customers At Yusni's Clothing Store," *Jurnal Teknologi Informasi dan Pendidikan*, vol. 15, no. 2, pp. 87–98, 2022.
- [6] A. Mustopa and I. Sari, "Analisis Kelengkapan Pengisian Rekam Medis Rawat Inap Dalam Menunjang Mutu Rekam Medis Di Rumah Sakit Dr Hafiz (Rsdh) Cianjur," *JMeRS (Journal of Medical Record Student)*, vol. 1, no. 2, pp. 10–19, 2022.
- [7] C. G. Chute, S. M. Huff, J. A. Ferguson, J. M. Walker, and J. D. Halamka, "There are important reasons for delaying implementation of the new ICD-10 coding system," *Health Aff*, vol. 31, no. 4, pp. 836–842, 2012.
- [8] A. L. Dinar, L. Abdurrahman, and I. Santosa, "Analisis Risiko Dan Kontrol Pada Simrs Rekam Medis Berdasarkan Iso 31000 (studi Kasus: Rumah Sakit Khusus Ibu Dan Anak Kota Bandung)," *eProceedings of Engineering*, vol. 7, no. 2, 2020.
- [9] K. S. Nair, S. Raj, V. K. Tiwari, and L. K. Piang, "Cost of treatment for cancer: experiences of patients in public hospitals in India," *Asian Pacific Journal of Cancer Prevention*, vol. 14, no. 9, pp. 5049–5054, 2013.

- 
- [10] H. Abdullah, "Analisis Kegiatan Pengelolaan Rekam Medis Rawat Inap Pasien Kanker Payudara Program Jamkesmas Untuk Mendukung Pengelolaan Pembiayaan Kesehatan Di Rumah Sakit Islam Sultan Agung Semarang Tahun 2011," *Jurnal Kesehatan Masyarakat Universitas Diponegoro*, vol. 2, no. 1, p. 18847, 2013.
- [11] J. Greenbaum *et al.*, "Child sex trafficking and commercial sexual exploitation: Health care needs of victims," *Pediatrics*, vol. 135, no. 3, pp. 566–574, 2015.
- [12] J. Judi, K. E. Werdani, and S. B. Purwaningsih, "Tata Kelola Dokumen Rekam Medis Sebagai Upaya Menjaga Rahasia Medis di Pelayanan Kesehatan," *Jurnal Manajemen Informasi Kesehatan Indonesia (JMIKI)*, vol. 5, no. 1, pp. 96–104, 2017.
- [13] A. Bhandari, A. Bansal, A. Singh, R. K. Gupta, and N. Sinha, "Comparison of transport of chemotherapeutic drugs in voxelized heterogeneous model of human brain tumor," *Microvasc Res*, vol. 124, pp. 76–90, 2019.
- [14] F. Herlana, I. M. Nur, and W. Purbaningsih, "Karakteristik pasien kanker serviks berdasar atas usia, paritas, dan gambaran histopatologi di RSUD Al-Ihsan Bandung," in *Bandung Meeting on Global Medicine & Health (BaMGMH)*, 2017, pp. 138–142.
- [15] A. D. Pujawan, R. A. Rendra, J. Arifin, and C. Agustin, "Design of Information System Vaccination Report Data Logging Web-Based Using Waterfall Method (Case Study at Bandung Health Office)," *JATISI (Jurnal Teknik Informatika dan Sistem Informasi)*, vol. 9, no. 1, pp. 110–125, 2022.
- [16] W. W. W. Wijaya and E. Susanto, "New Normal: Pengembangan Sistem Informasi Penjualan Menggunakan Metode SDLC (System Development Life Cycle)," *Jurnal Sustainable: Jurnal Hasil Penelitian Dan Industri Terapan*, vol. 10, no. 1, pp. 1–9, 2021.
- [17] D. Nurdiana, M. Fajar, D. Rahadian, P. Sidiq, and N. A. Hamdani, "Development of general transportation applications in Garut City web-based," in *Journal of Physics: Conference Series*, IOP Publishing, 2019, p. 022033.
- [18] J. Rahmadoni, R. Akbar, and U. M. Wahyuni, "Web-Based Cooperation Information System at The Science Techno Park Technology Business Development Center," *Journal of Applied Engineering and Technological Science (JAETS)*, vol. 3, no. 2, pp. 156–167, 2022.
- [19] J. E. T. Akinsola, A. S. Ogunbanwo, O. J. Okesola, I. J. Odun-Ayo, F. D. Ayegbusi, and A. A. Adebisi, "Comparative analysis of software development life cycle models (SDLC)," in *Intelligent Algorithms in Software Engineering: Proceedings of the 9th Computer Science On-line Conference 2020, Volume 1 9*, Springer, 2020, pp. 310–322.
- [20] T. Saravanan, S. Jha, G. Sabharwal, and S. Narayan, "Comparative Analysis of Software Life Cycle Models," in *2020 2nd International Conference on Advances in Computing, Communication Control and Networking (ICACCCN)*, IEEE, 2020, pp. 906–909.