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Don Mariano Marcos Memorial State University Medical OutPatient Records Management System: A Prototype

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Abstract: Exploring a transformative solution is driven by the inefficiencies inherent in the traditional manual, paper-based outpatient record management system at Don Mariano Marcos Memorial State University (DMMMSU). This research introduces the Medical Out-Patient Records Management System (MORMS) to fill this gap. Developed through the software development lifecycle, this MORMS optimally maintains outpatient records; therefore, it assists medical professionals in recording, organizing, and retrieving patient data effortlessly. Notably, statistical reports represent data trends that are an invaluable product. The overall approval of MORMS was unanimous during User Acceptance Testing (UAT), with each tested component receiving a 100 percent acceptability index. Based on this assessment, it can be concluded that there is a high likelihood of integrating the system into the daily processes of DMMMSU's medical officers across all its three campuses because its usefulness is valued by them. Moreover, usability testing validates the functional practicality of MORMS with respect to the Computer System Usability Questionnaire subscales - system usefulness, information quality, and interface quality. Consistent median ratings of 1 for these scales indicate pragmaticity or practicability; dependability; precision and ease of use, which are some merits of this methodical tool. Consequently, not only gaining acceptance from users but also being highly usable makes MORMS effective in complying with various requirements set by different groups within DMMMSU's medical staff.

Keywords: Medical, Records management system, Usability testing, User acceptance testing

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1. Introduction

The efficient management of medical records is critical in the dynamic terrain of healthcare administration. This is particularly true for outpatient services, where streamlined information retrieval and systematic record-keeping are crucial to ensuring quality health care. This study aims to develop the Medical OutPatient Records Management System (MORMS) as a response to this problem. Our investigation recognizes the existing traditional paper-based systems' problems; and thus, gives a forward-thinking proposition that will enhance accessibility, accuracy, and overall effectiveness in managing medical records for outpatients through technology. This prototype provides a snapshot into the healthcare administration of tomorrow by proposing a new method of dealing with complications related to outpatient record-keeping in the changing health service environment.

Some remarkable technological developments have been registered in digital platforms for medicine and healthcare during the past few years. Currently, the vast majority of patients' medical records are being collected electronically and present unbeatable chances for research, improvement of health care delivery, and improvement of patients' outcomes [1][2]. On the other hand, a lot of patients' information is provided in free-text format by clinicians, nurses, or caregivers through interviews and assessments. These text-based medical records capture a wealth of information about the patient's history as expressed in natural language that contains nuanced details [3].

The arrangement of this free-text client information may not be novel, but the techniques and tools that can be used to derive and analyze this data have made it possible to work with records management as well as Electronic Health Records (EHRs). With technological improvements in analyzing data, the use of information in EHR systems has increased [4][5]. Furthermore, EHRs facilitate health information exchange, clinical decision support, diagnostic support, and patient health portals, among others. Due to government policies, technological developments, healthcare challenges, and market situations, EHR has also become a part of the modern health system, which could enhance care quality and workflow safety [6].

According to Philippine Republic Act Number 11223 or the "Universal Health Care Act" of July 23, 2018, Section 2B, there shall be a model of healthcare that affords all Filipinos an opportunity for comprehensive, quality, and cost-effective health promotion activities while preventing diseases, curing them, restoring patients to health, and providing pain relief at the least possible cost, and that also takes into consideration the needs of people who cannot afford such services [7]. To provide high-quality healthcare services and meet the public's requirements, there should be an effective method for collecting, categorizing, and managing data on health. And once it has been identified what it is that people need, this means that relevant medical treatments may be delivered directly in such a case.

The healthcare sector has witnessed tremendous growth and application of Information Communication Technologies (ICT), which are used to handle voluminous health records and other big data. Health information technology is a broad term that refers to the use of ICT in providing healthcare [8-10]. The current trend worldwide towards the adoption of HIT into healthcare systems is fast growing. EHR, one of various IT initiatives in global health care, is typically considered a backbone supporting the integration of different e-health tools. Integrating an EHR within the healthcare system could result in effective service provision by ensuring that relevant, accurate, timely, and complete facts are given [11].

EHRs are widely adopted by studies. According to the study by Ausserhofer *et al.* [12], healthcare organizations globally are increasingly adopting EHRs to enhance safety, quality, and efficiency of care. On the other hand, as far as patient care is concerned, there is not much known about how its delivery can be affected positively when EHR is adopted. Some of these include better adherence to guideline care, improved surveillance and monitoring, enhanced clinical decision-making, and fewer medication

errors [13]. For instance, even if the overall quality of documentation is not improved by the electronic system, like in cases where paper-based documentation standards are already too high, one of the expected advantages of EHR is increased time efficiency [14].

The research conducted by Baumann, *et al.* [15] stated that, on the contrary, during their implementation phases, the opposite happened for physicians, where documentation time increased from 16% to 28% and nurses from 9% to 23%. Although healthcare providers are supported in this area by EHRs, which hence reduce their documentation burden, thus giving them more time for dedicated patient care, there may be a strong initial impact on their workloads, which could become a significant barrier to the successful implementation and long-term use of such systems, but it was also found that once care workers are familiar with their particular systems, EHRs have great potential toward improving the quality and safety of workflows. However, similar to other widely implemented systems delivering improvements in practice, the intended advantages of EHR can only be realized within real-world settings through continuous feedback and incremental change. To get a better insight into how EHRs contribute to workflow safety or how the use of these technologies in small and large clinical setups could expose patients to risks or hazards, more qualitative surveys will be required.

The use of EHR systems allows for data mining to enhance patient care, and EHR adoption by hospital systems (as well as small practices) and interconnecting these systems is one of the major drivers of health research. The range of applications and tools that provide a means to electronically manage healthcare comprises EHR software. Besides, EHRs can measure a multitude of operational and clinical metrics, which lead to improvements in productivity within organizations. With all data points available for auditing, analysts can monitor who does what and who achieves what, while management can decipher anomaly patterns from the data [16][17].

Despite the vast strides in digital healthcare, the Don Mariano Marcos Memorial State University (DMMMSU) in La Union, Philippines, still uses traditional paper records for its outpatient record management system. The university struggles with record keeping, information retrieval, and adapting to the ever-changing healthcare landscape. Because of these limitations, we recognize that our research needs to provide a strategic solution by developing an Electric Medical OutPatient Records Management System tailor-made for DMMMSU's specific needs. This forward-thinking initiative aims to capitalize on global trends in health information technology by enhancing accessibility, accuracy, and overall efficiency when it comes to managing outpatient medical records. To make sure the system works as intended, User Acceptability Testing and usability testing will be performed. It is essentially important to fully understand how this new software will integrate into their current healthcare practices so that it can contribute to even more advancements in healthcare administration.

2. Methods and Materials

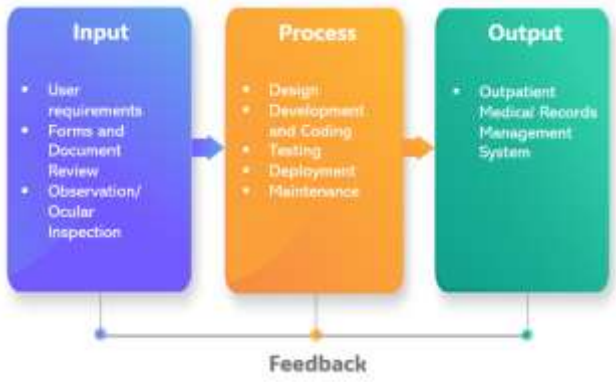


Figure 1. Research Paradigm

Figure 1 illustrates the research paradigm employed in this study, providing a visual representation of the systematic approach undertaken to develop an effective Medical Outpatient Records Management System (MORMS). This paradigm encompasses three pivotal phases: Input, Process, and Output, each contributing distinct elements to the overall methodology.

2.1 Input

Figure 1 shows how the students' users use the application and how the guidance counselor can manage and control the application.

The leftmost segment of Figure 1 signifies the beginning of the research journey with the Input Phase. In this phase, the groundwork for the MORMS is outlined by exploring user requirements, forms, document reviews, and on-site observations, which are crucial to developing the software [18].

Interviews were conducted with a total of 17 personnel distributed across the medical units of each campus of DMMMSU, which includes the North La Union Campus, Mid La Union Campus, and South La Union Campus. Their requirements were identified to be utilized in later phases of this study. Furthermore, it is made sure to thoroughly review the existing outpatient medical record forms as well as documentation processes, which involve an in-depth analysis of their current paper-based system. To provide some context, the forms that were utilized when rendering out-patient services were identified, such as F001_PERSONAL_DATA_SHEET, F002_OUT-PATIENT_RECORD, and F009_PATIENT_TREATMENT_RECORD. The medical units of DMMMSU were also visited to conduct on-site observations and ocular inspections. By doing this, an in-depth look at their daily operations, user interactions, and day-to-day challenges faced by personnel when managing outpatient medical records was achieved. Ethical standards were followed as an ethical review was conducted for the study, and then informed consent was obtained from all participants involved in the data-gathering process.

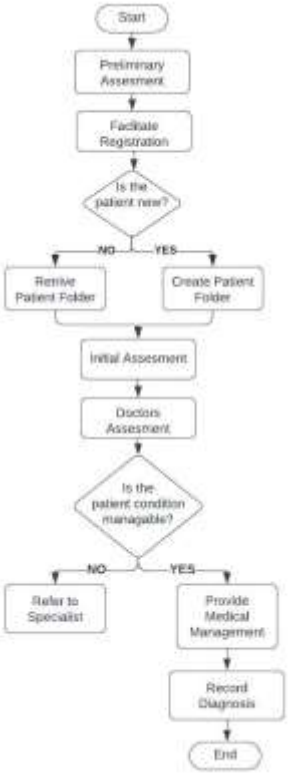
2.2 Process

In the process stage, the identified user requirements are transformed into the MORMS through design, development, testing, deployment, and maintenance [19].

2.2.1 Design Phase

The design phase involved translating the gathered requirements and observations into a conceptual framework for the MORMS. This encompassed the creation of the workflow diagram for the MORMS, as illustrated in Figure 2. Within this workflow, personnel conduct a preliminary assessment of the patient before initiating the process of creating or retrieving their medical record. Subsequently, the doctor performs an assessment, deciding whether to refer the patient to a specialist or provide medical management to record a diagnosis.

As part of the design phase, a use case diagram was created to help illustrate the functional aspects of the MORMS, as presented in Figure 3. The diagram serves as a highlight reel for all of the different functionalities within the MORMS. This system is primarily designed with medical office personnel (*e.g.*, doctors, nurses, and staff members) in mind. It serves as a graphical representation of the various actions and interactions that these users can do within the system.



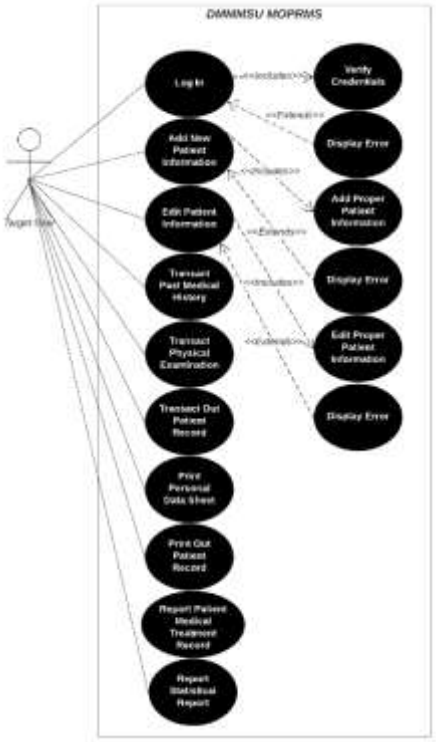


Figure 2. Workflow Diagram of MORMS

Figure 3. Use Case Diagram of MORMS

In addition to the use case diagram, wireframes were made for the MORMS during the design phase. Exemplary instances of these wireframes are displayed in Figure 4. These visual representations provide a skeletal outline of the system's interface, showcasing the layout and arrangement of key elements. The wireframes serve as a preliminary design blueprint, offering a tangible preview of the MORMS user interface and facilitating further refinement based on user feedback and system requirements.

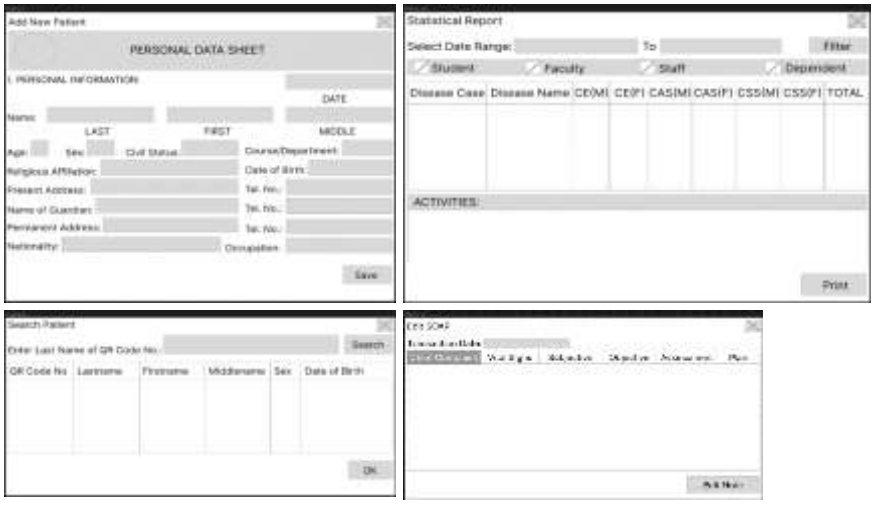


Figure 4. Sample Wireframes of MORMS

2.2.2 Development Phase

Once the design was approved, the process moved to the development stage, where the MORMS were built using appropriate technology and programming languages. In this case, Visual Basic 6.0 and

MySQL were used as the selected system development tools. The use of Visual Basic 6.0 made it easy to develop an interface that is user-friendly, as opposed to MySQL, which acted as a backend database capable of storing and retrieving large amounts of data within seconds. To ensure that integrity is maintained in the code base and quality is maintained, a systematic approach was adopted, which included regular code reviews and version control practices. Such detailed steps ensured adherence to industry standards concerning reliability, security, and maintainability throughout MORMS' lifecycle.

2.2.3 Testing Phase

During the testing phase, a comprehensive evaluation of the developed MORMS was carried out. The researchers actively engaged in remediation and mitigation strategies to improve the robustness of the system after identifying and analyzing any defects that were detected while using the software. Also, there was the formation of a well-laid-down plan for User Acceptance Testing (UAT), which came after interviews, observation, and document reviews.

In the UAT, the questionnaire includes 26 questions that the subject matter and are explained together with test cases and performance tests about specific functional requirements, scope, and other scenarios. The focus of this questionnaire was on how to prompt medical practitioners working at DMMMSU hospital units for their opinions about such functions and attributes as have been made by those who are responsible for their creation. The researchers were present during the UAT process to guide the respondents through it, hence ensuring a comprehensive collaborative assessment of MORMS.

2.2.4 Deployment Phase

To deploy the MORMS, meticulous planning was done. It was carefully launched into a controlled healthcare setting. This encompassed vital activities including data migration, personnel familiarization, and initial user support. These were intended to ensure that there is minimum disruption of daily operations in the transition from the manual system to electronic MORMS.

After three months of rigorous use, the MORMS implementation phase embarked on usability testing. This assessment utilized the Computer System Usability Questionnaire (CSUQ) [20], which was specially designed to determine user-friendliness and overall systems' usability. A CSUQ questionnaire was given to 17 medical personnel from DMMMSU to get insights about their experiences and perceptions concerning the MORMS. The results of this usability testing stage provided important input for possible revisions or enhancements to the system so that it could continuously meet the requirements and desires of its end-users.

There are seven points in the CSUQ, and respondents have the opportunity to answer "Not Applicable" (NA) if a statement does not apply to their usability testing experience [21]. The CSUQ score is broken down into four different measures: an overall score that was derived from the average of all 16 items in the questionnaire, and three subscales for system usefulness (SYSUSE), information quality (INFOQUAL), and interface quality (INTERQUAL). The overall score is derived from the average of all 16 items in the questionnaire, while SYSUSE is the average score of questions one to six, INFOQUAL is the average score of questions seven to 12, and INTERQUAL is the average score of questions 13 to 15.

The CSUQ scale has a rating of one being "strongly agree" and seven representing "strongly disagree." It is worth noting that lower scores on the CSUQ scale indicate good performance and high user satisfaction levels. Nevertheless, it is vital to appreciate the fact that four is seen as neutral but not necessarily average. Less than four does not in any way suggest that the website, system, software, or product has performed above average.

2.2.5 Maintenance Phase

In the three months' time of utilizing MORMS, there have been continuous dedicated efforts in maintaining the system. This maintenance phase was necessary for fixing any problems that arose, optimizing system performance, and making sure that user feedback and evolving requirements were acted upon through necessary updates. Monitoring functionality problems, fixing identified bugs or issues, and ensuring uninterrupted running of MORMS within a healthcare environment were routine activities.

2.3 Output

The right side of Figure 1 introduces the Output Phase. The main focus at this point is a fully developed MORMS that has undergone rigorous testing through UAT and usability testing. The UAT was instrumental in ensuring that the MORMS satisfied predefined conditions for acceptance by end users, specifically the DMMMSU's medical staff. Additionally, usability testing explored user experience issues relating to the system's friendliness to users and ease of use.

3. Results and Discussion

3.1 Developed Medical Outpatient Records Management System

The MORMS was developed and implemented across all three campuses of DMMMSU, where it proved to be successful. To achieve a smooth changeover, an orientation session was held for medical practitioners to familiarize them with the system's usage, structure, and functionalities as a whole. It was positioned at each campus clinic in terms of its physical setting. This involves housing a local server with a local database connected to a local host through a LAN cable to the wireless router. This permits the installation of the system on various devices that target users may use within the same network. Upon installation and connection, they can access the system by logging in, thereby opening up some necessary functions of outpatient medical record management. Such an arrangement guarantees that within the local network infrastructure, medical personnel can use different devices when the need arises.

Moreover, Figure 5 represents the main window or menu of MORMS, which is the key point in implementing significant system functions. This major menu has some principal categories: Patient, Transaction, Print, and Report. Each of these menus has central features aimed at simplifying and organizing various aspects concerning outpatient medical record management within the system.

Figure 5. Main Window of the MORMS

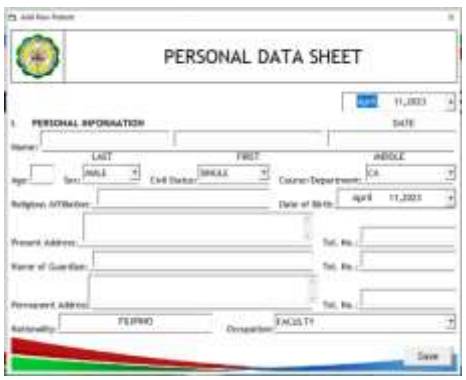


Figure 6. Personal Data Sheet Window

Within the "Patient" menu of the MORMS, selecting “Add New Patient Information” navigates the user to the “Add New Patient Window.” In this interface, users can input comprehensive patient data using the “Personal Data Sheet,” as depicted in Figure 6. Similarly, within the same “Patient” menu, choosing “Edit Patient Information” directs the user to the “Search Patient” window. In this section, users can input a registered patient's Quick Response (QR) code or last name into the search field. The system responds by presenting the relevant patient data, allowing the user to make edits directly within the “Personal Data Sheet.”

On the “Transaction” menu, selecting “Past Medical History” directs the user to the dedicated “Past Medical History” window (see Figure 7). In this interface, users can seamlessly add, view, or update a patient's medical history. Similarly, choosing “Physical Examination” from the same “Transaction” menu leads the user to the “Physical Examination” window, showcased in Figure 8. In this section, users can input data obtained from the results of the actual physical examination of the patient. If the patient is already registered, the user can conveniently view or update the patient's physical examination records. Additionally, clicking “Out-Patient Record” within the “Transaction” menu prompts the user to the “Out-Patient Record” window, illustrated in Figure 9. In this interface, the user has the flexibility to add, edit, remove, and print selected Subjective, Objective, Analysis, and Plan (SOAP) notes related to the patient.

Figure 7. Past Medical History Window

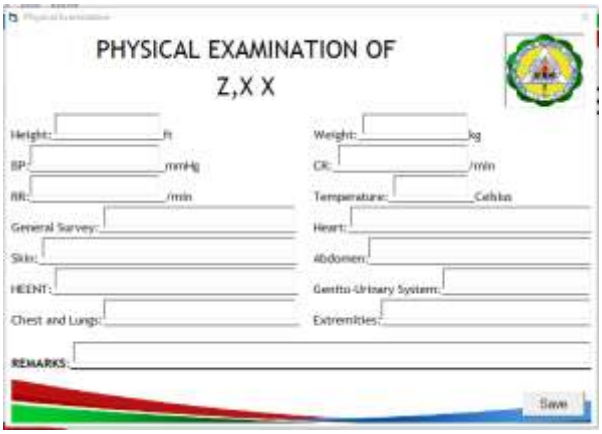


Figure 8. Physical Examination Window

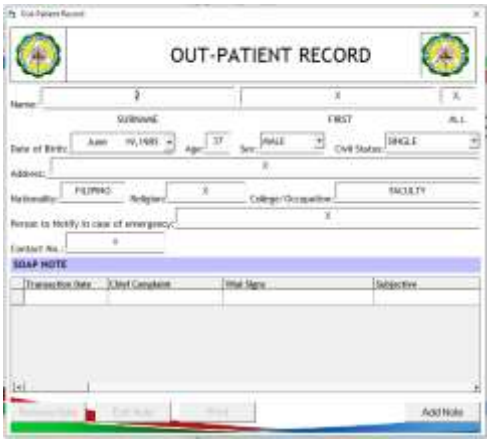


Figure 9. Outpatient Record Windows

Figure 10. Print Medical Treatment Record

Within the “Print” menu of the OMRMS, selecting “Personal Data Sheet” enables the user to print the entire personal data sheet form of the chosen patient. Additionally, the system facilitates the printing of the out-patient record form specific to the selected patient. Furthermore, the MORMS provides the capability to print the medical patient treatment record for a particular department and month, as indicated in Figure 10. Moreover, Figure 11 exemplifies the system's capability to generate a statistical report detailing diseases or illnesses.

Figure 12 provides a sample screenshot illustrating the system installation process and the orientation conducted for users. This phase involves acquainting users with the system's features, overall structure, and functionalities.

Figure 11. Statistical Report

Figure 12. Installation and Conduct of Orientation to Users

As a result, the MORMS exclusively addresses the specific requirements of DMMMSU’s medical unit and thus represents an effort toward modernizing outpatient record management and improving healthcare administration overall.

3.2 Evaluation of the Developed MORMS

Table 1 presents the results of UAT outcomes, covering six distinct components, including the login window, landing window, patient menu, transaction menu, print menu, and report menu. The table illustrates the distribution, expressed in percentages, of respondents who provided “Yes” or “No” responses for each item assessed in the test. With a total of 17 respondents, the results show unanimous approval of the functionalities integrated into the developed MORMS. This unanimous consensus is evident through the 100% affirmative responses recorded for every test item, indicating that all participants acknowledged and approved of the functionalities during the UAT phase. This shows that MORMS meets user expectations effectively, as agreed upon by many participants. Also, their agreement in all elements implies that this system is fitting for incorporation into the everyday work routines of medical personnel within three campuses at DMMMSU.

Moreover, the usability testing was conducted using CSUQ. Assessing the System Usefulness aspect, respondents consistently assigned a median rating of 1 across all six items for the developed MORMS, as exhibited in Table 1. This uniform rating signifies that the majority of the respondents strongly agree with the system's utility. The consistent and favorable median rating underscores the perceived usefulness of the MORMS, as unanimously acknowledged by the participants during the usability testing phase. The median ratings for each system usefulness are depicted in Table 2.

Table 1. Results of the User Acceptance Test

Component	Function	Yes (%)	No (%)
1. Log in Window	1. User can log-in with given credentials.	100	0
2. Landing Window	1. Application has a landing window.	100	0
3. Patient Menu	(Add New Patient Information)	100	0
	1. User can add new patient information.		
	(Edit Patient Information)	100	0
	1. User can search for patients.		
	2. User can update patient information.	100	0
4. Transaction Menu	(Past Medical History)	100	0
	1. User can search for patients.		
	2. User can add Past Medical History for new client.	100	0
	3. User can update patients Past Medical History data.	100	0
	(Physical Examination)	100	0
	1. User can search for patients.		
	2. User can add physical examination for new client.	100	0
	3. User can update patients' Physical Examination data.	100	0
	(Out-Patient Record)	100	0
	1. User can search for patient.		
	2. User can view patient SOAP notes.	100	0
	3. User can add new SOAP notes.	100	0
	4. User can edit SOAP notes.	100	0
	5. User can remove SOAP notes.	100	0
	6. User can print SOAP notes.	100	0
5. Print Menu	(Personal Data Sheet)	100	0
	1. User can search for patients.		
	2. User can view patients' Personal Data Sheet.	100	0
	3. User can print patients' Personal Data Sheet.	100	0
	(Out-Patient Record)	100	0
	1. User can view all of patients' Out-Patient Record.		
	2. User can print all of patients' Out-Patient Record.	100	0
6. Report Menu	(Medical Patient Treatment Record)	100	0
	1. User can view Medical Patient Treatment Record per Department, Occupation, and Month.		
	2. User can print Medical Patient Treatment Record per Department, Occupation, and Month	100	0
	(Statistical Report)	100	0
	1. User can view and filter Statistical Report per Occupation and range of date.		
	2. User can print and filter Statistical Report per Occupation and range of date.	100	0

Table 2. Median Rating for Each System Usefulness Item

System Usefulness Indicators		Continuum								Median Rating
1	Overall, I am satisfied with how easy it is to use this system.	Strongly Agree	1	2	3	4	5	6	7 Strongly Disagree	NA	1
2	It is simple to complete my work quickly using this system.	Strongly Agree	1	2	3	4	5	6	7 Strongly Disagree	NA	1
3	I am able to complete my work quickly using this system.	Strongly Agree	1	2	3	4	5	6	7 Strongly Disagree	NA	1
4	I feel comfortable using this system.	Strongly Agree	1	2	3	4	5	6	7 Strongly Disagree	NA	1
5	It was easy to learn to use this system.	Strongly Agree	1	2	3	4	5	6	7 Strongly Disagree	NA	1
6	I believe I became productive quickly using this system.	Strongly Agree	1	2	3	4	5	6	7 Strongly Disagree	NA	1
									Overall		1

Focusing on the Information Quality aspect, respondents provided a median rating of 1 for all six items related to the developed MORMS, as shown in Table 3. This consistent median rating indicates that the majority of the respondents strongly agree with the high quality of information provided by the system.

Table 3. Median Rating for Each Information Quality Item

Information Quality Indicators		Continuum									Median Rating
7	The system gives error messages that clearly tell me how to fix problems.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
8	Whenever I make mistakes using the system, I recover easily and quickly.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
9	The information (such as online help, on-screen messages, and other documentation) provided with this system is clear.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
10	It is easy to find the information I needed.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
11	The information provided with the system is effective in helping me complete my work.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
12	The organization of information on the system screen is clear.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
										Overall		1

Table 4 shows the results related to the Interface Quality aspect of CSUQ. Across the three relevant items, respondents consistently assigned a median rating of 1. These items include assessing the pleasantness of the system's interface, personal liking for its usage, and alignment with expected functions and capabilities. The results show unanimous agreement among the majority of respondents regarding the high quality of the MORMS interface.

Table 4. Median rating for each interface quality item

Interface Quality Indicators		Continuum									Median Rating
13	The interface of this system is pleasant.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
14	I like using the interface of this system.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
15	This system has all the functions and capabilities I expect it to have.	Strongly Agree	1	2	3	4	5	6	7	Strongly Disagree	NA	1
										Overall		1

The UAT results, in addition to usability testing, revealed how the MORMS would work in medical units. The three primary dimensions of CSUQ – system usefulness, information quality, and interface quality – provide sharp illumination. Regarding system usefulness, the median rating of 1 uniformly implies that the MORMS features match practical issues of health care delivery. Patient data reliability,

as depicted by the information quality subscale, which had a continued mean rating of 1, is one feature with overwhelming agreement among users. As far as the Interface Quality Scale is concerned, it was rated positively, implying a good and likable design with its user-friendly features that are consistent with what people expect from a platform like this for smooth online interaction. These stable outcomes confirm that the MORMS is not only acceptable but also highly practical and efficient enough to meet the requirements of DMMMSU's medical staff.

4. Conclusion and Recommendations

This study aimed to address the inefficiencies inherent in the traditional manual paper-based outpatient record management system at DMMMSU by introducing the MORMS. Through the software development lifecycle, MORMS was developed to optimize outpatient record maintenance, aiding medical professionals in recording, organizing, and retrieving patient data effortlessly. The unanimous approval received during the UAT underscores the system's efficacy and acceptance among medical professionals at DMMMSU. This high level of user satisfaction is indicative of MORMS's ability to meet the needs and expectations of its intended users. Each tested component achieving a 100 percent acceptability index signifies the system's perceived usefulness and functionality in outpatient record management.

Furthermore, the consistent median ratings for usability, particularly in terms of system usefulness, information quality, and interface quality, underscore the practicality and ease of use of MORMS. These favorable ratings highlight that the system is not only functional but also intuitive and user-friendly, catering to users with varying levels of technical proficiency. Such usability is crucial for ensuring the seamless integration of MORMS into the daily workflows of medical professionals at DMMMSU. The high likelihood of integrating MORMS into their daily processes reflects the system's perceived value and utility in supporting essential tasks related to outpatient record management.

Future research efforts should focus on conducting long-term evaluations of MORMS to assess its impact on patient care outcomes and workflow efficiency. Continuous maintenance, updates, and technical support will be essential to ensuring the system's continued effectiveness and usability. Additionally, interdisciplinary collaboration between healthcare professionals, IT experts, and policymakers will drive innovation and best practices in healthcare technology, fostering a collaborative ecosystem for developing more effective solutions in outpatient record management.

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