LYING-IN CLINIC INFORMATION MANAGEMENT SYSTEM FOR BUHI MUNICIPALITY

[1]Leni Girlie M. Idian
[2]Marco L. Espinosa, MIT

Aemilianum College Inc.   Piot, Sorsogon City, Sorsogon, Philippines

Abstract

This study specifically aimed to develop an Enhanced Patient Care System by ensuring that all patient records are comprehensive and up-to-date. Key features of the system include storing detailed patient profiles, medical histories, test results, current medications, and treatment plans, while providing real-time updates to maintain accuracy and accessibility. Additionally, the system seeks to optimize workflow efficiency by automating critical tasks such as appointment scheduling and patient documentation, streamlining operations and reducing administrative burdens.

The study also focused on improving inventory management by implementing real-time tracking to ensure the availability of necessary supplies while avoiding stockouts or overstock situations. Automated alerts for low stock levels or approaching expiration dates were included to facilitate timely reordering and avoid disruptions. Furthermore, the system incorporates support for clinical decision-making through decision-support tools that leverage patient data and evidence-based guidelines for accurate and timely treatment decisions. Predictive analytics were also utilized to anticipate patient needs, identify potential complications, and optimize resource allocation using historical data and trends. Lastly, the system was evaluated based on

ISO 25010 standards, assessing key quality characteristics such as functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability, ensuring that the system meets high standards of quality and user satisfaction.

During the development and after testing and evaluation of the developed system, the following findings have been established: The study successfully developed an Enhanced Patient Care System that integrates comprehensive patient records, including patient profiles, medical histories, test results, current medications, and treatment plans, while ensuring real-time updates for accuracy and accessibility. It effectively integrated optimized workflow efficiency by automating tasks such as appointment scheduling and patient documentation, streamlining operations and reducing manual administrative work. The inventory management system was enhanced by implementing real-time tracking to ensure the availability of necessary supplies and setting automated alerts for low stock levels or approaching expiration dates, preventing shortages and enabling timely reordering. Additionally, the study developed a system that supports clinical decision-making by providing decision support tools that utilize patient data and evidence-based guidelines

for accurate treatment decisions, while using predictive analytics to anticipate patient needs, identify potential complications, and optimize resource allocation. Finally, the system was evaluated using ISO 25010 standards, confirming that it meets expectations in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

Based on the findings of this study, the following conclusions were formulated: The study successfully developed an Enhanced Patient Care System that integrates comprehensive patient records with real-time updates, ensuring accurate and accessible information for improved healthcare delivery. The system effectively enhanced workflow efficiency by automating tasks like appointment scheduling and patient documentation, leading to streamlined operations and reduced manual administrative work. Additionally, the system improved the inventory management system by incorporating real-time tracking and automated alerts, ensuring the availability of supplies and preventing shortages through timely reordering. The developed system also enhances clinical decision-making by utilizing decision support tools and predictive analytics to improve treatment accuracy, anticipate patient needs, and optimize resource allocation. Finally, the system was evaluated using ISO 25010 standards, confirming that it meets expectations across all key quality characteristics, including functional suitability, performance

Keywords

Aemilianum College Inc., Appointment Scheduling, Automation in Clinics, Buhi Municipality, Clinic Management, Electronic Medical Records

efficiency, compatibility, usability, reliability, security, maintainability, and portability, with an overall rating of 3.61, indicating that the developed system meets expectations.

Based on the conclusions drawn from this study, the following recommendations were formulated: First, it is essential to continually update and maintain the Enhanced Patient Care System while exploring further integration with other healthcare systems to enhance data sharing and interoperability. Additionally, expanding the automation features by incorporating additional tasks and processes can further maximize workflow efficiency and reduce administrative burden. Continuous monitoring of inventory trends and refining the real-time tracking and automated alert system will optimize supply levels and enhance the efficiency of reordering processes. The decision support tools and predictive analytics should be further refined to incorporate more diverse data sources, improving treatment accuracy and enhancing the system's ability to anticipate patient needs. Regular evaluations based on ISO 25010 standards should be conducted to ensure the system continues to meet expectations and identify potential improvements in functionality, performance, and other key quality characteristics. Lastly, gathering continuous feedback from end-users and stakeholders will help identify operational challenges or areas for enhancement, ensuring the system evolves to meet changing healthcare needs and technological advancements.

(EMR), Health Information System, Health Monitoring, Information Management System, Local Government Health Services, Lying-in Clinic, Patient Records System.

Introduction

Globally, healthcare systems are increasingly adopting Health Information Systems (HIS) to enhance data management and streamline processes. HIS ensures the availability of real-time patient data, facilitating better clinical decisions and improved healthcare delivery. It plays a critical role in addressing inefficiencies, such as disjointed patient flows and uncoordinated care (Epizitone et al., 2023). Furthermore, with advancements in information technology, clinics and hospitals worldwide have transitioned towards digital systems to promote better patient outcomes and support public health objectives (PLOS ONE, 2022).

In the Philippines, healthcare systems face challenges in achieving full digitalization, yet initiatives are underway to promote the use of information technology in hospitals and primary care centers. The government, through the Department of Health (DOH), supports the integration of HIS to provide better management of records and access to services. National efforts, such as the Universal Health Care (UHC) Act, emphasize the importance of data-driven strategies to improve care coordination, especially in underserved rural areas (Department of Health, 2023).

At the local level, Buhi Municipality in Camarines Sur encounters the typical struggles of rural healthcare providers, including limited resources and inefficient data handling. Traditional paper-based processes at clinics, including lying-in facilities, have led to operational delays, hindering patient care and complicating record-keeping. An information management system dedicated to these clinics would not only streamline patient records but also reduce administrative burdens, ensuring more timely and efficient maternal care services.

This project, the Lying-In Clinic Information Management System for Buhi, aims to address these gaps by providing an efficient platform for managing patient information, appointments, and medical history. Such a system is essential in promoting quality maternal care and improving health outcomes in the community. The system's advantages include enhanced data accessibility, reduced paperwork, and better patient monitoring, which aligns with national health goals and community well-being objectives. It is also expected to foster smoother coordination between local health workers and municipal health units, benefiting both patients and providers

Specific Objectives

1. Develop an Enhanced Patient Care System by ensuring all patient records include:
   1.1. Patient profile
   1.2. Medical histories
   1.3. Test results
   1.4. Current medications
   1.5. Treatment plans
   1.6. Providing real-time updates in all records

2. Integrate optimized workflow efficiency by:
   2.1. Automating tasks such as:
   2.2. Appointment scheduling
   2.3. Patient documentation

3. Improve inventory management system by:

   3.1. Implementing real-time tracking: ensure that necessary supplies are

always available, minimizing, stock outs or overstock situations.

    3.2. Setting an automated Alerts: For low stock levels or approaching expiration dates, to prevent shortages and ensure timely reordering.

4. Develop a system that supports clinical decision-making by:

    4.1. Providing decision Support Tools: Utilize patient data and evidence-based guidelines to assist in making accurate and timely treatment decisions.

    4.2. Using predictive analytics: Anticipate patient needs, identify potential complications, and optimize resource allocation based on historical data and trends.

5. Evaluate the system using ISO 25010 standards in terms of:

    5.1 Functional Suitability
    5.2 Performance Efficiency
    5.3 Compatibility
    5.4 Usability
    5.5 Reliability
    5.6 Security
    5.7 Maintainability
    5.8 Portability

Scope and Delimitations

The scope of this study focused on the development of a Lying-In Clinic Information Management System designed to enhance patient care and streamline operations within clinics in Buhi Municipality, Camarines Sur. The system ensured that all patient records were complete and up-to-date, including patient profiles, medical histories, test results, current medications, and treatment plans. It provided real-time updates across these records to facilitate continuity of care. Additionally, the system aimed to improve operational efficiency by automating key processes, such as appointment scheduling, and patient documentation. A real-time inventory management module was incorporated to prevent supply shortages or expirations by tracking stock levels and issuing automated alerts. The clinical decision-making process was enhanced through decision support tools and predictive analytics, enabling timely and accurate treatment decisions based on historical data and trends. Finally, the system was evaluated using the ISO/IEC 25010 standard, assessing it across dimensions such as functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

The delimitations of this study specified that the system was implemented and tested exclusively within the lying-in clinics of Buhi Municipality. The scope was limited to the operational requirements of these clinics, meaning that other healthcare facilities or general hospitals were beyond the system's coverage. The project did not focus on developing mobile applications or remote monitoring features. Instead, it prioritized in-house use by clinic personnel.

Gap Bridged by the Study

The reviewed systems highlighted specific advancements in healthcare management by introducing digital solutions to address inefficiencies in traditional manual

practices. Abad's Medical Out-Patient Records Management System (MORMS) provided a comprehensive digital platform for managing outpatient records, featuring efficient data recording, organization, and retrieval through software development. This system emphasized statistical reporting to track data trends and demonstrated high user satisfaction with a 100 percent acceptability index during User Acceptance Testing (UAT). Similarly, Dator's study focused on a lying-in clinic and investigated the barriers posed by manual practices in record management, appointment, and scheduling. Both systems showcased improvements in operational efficiency and user feedback integration, bridging gaps in paper-based processes.

The present study, however, bridged gaps not fully addressed by the reviewed systems by taking a more holistic and integrated approach to patient care. Unlike the reviewed systems, which focused on specific implementations or localized issues, the present study aimed to optimize patient care across various healthcare settings by incorporating advanced features that address a wider range of healthcare needs. It sought to integrate existing government programs and tackle regional disparities in healthcare resources, offering a broader scope for improving healthcare delivery. This unique approach aimed to enhance overall service quality and accessibility beyond the confines of individual or specific clinic-based solutions, addressing gaps in comprehensive healthcare management that were not fully covered by the reviewed systems.

Plan

The "Planning" section of the study "Lying-In Clinic Information Management System for Buhi Municipality" focuses on the foundational stage of developing the proposed system. It involves identifying the specific needs and challenges faced by the lying-in clinic, such as inefficient record management, manual processes, and data inaccuracies. The planning phase defines the scope of the system, sets clear objectives, and outlines the necessary features to improve clinic operations, including patient information storage, appointment scheduling, and report generation. Furthermore, this stage includes resource allocation, risk assessment, and timelines to ensure systematic progress. It also emphasizes collaboration with stakeholders, such as clinic staff and municipal health authorities, to ensure the system aligns with their requirements and integrates seamlessly into existing workflows. This phase serves as the blueprint for designing and implementing

a reliable and efficient information management solution.

In addition, the planning phase incorporates a thorough assessment of the technical requirements and the feasibility of implementing the system within the available resources of the clinic. This includes selecting the appropriate hardware and software, ensuring data security, and planning for scalability to accommodate future growth in patient volume and clinic services. The section also considers the training needs of clinic staff to ensure smooth adoption of the system and reduce resistance to change. Stakeholder consultations play a vital role in refining the system's design by gathering input on essential functionalities and addressing concerns. By focusing on comprehensive planning, the study ensures that the proposed system is not only functional but also sustainable and adaptable

to the evolving needs of the clinic and its patients.

Requirements

This section outlines the essential components and specifications needed to develop and implement the Lying-In Clinic Information Management System for Buhi Municipality. It identifies both functional and non-functional requirements critical to the system's success. Functional requirements include features like patient registration, appointment scheduling, medical record management, report generation, and billing functionalities. Non-functional requirements cover aspects such as system performance, data security, scalability, and user-friendliness to ensure efficient and secure operations. This section also details the hardware and software prerequisites, such as server capacity, database management tools, and user interfaces, along with internet connectivity requirements. By defining these requirements, the study establishes a clear framework that guides the system's design, development, and deployment phases, ensuring it meets the clinic's operational needs effectively.

Moreover, the "Requirements" section emphasizes the importance of aligning the system's capabilities with the specific needs of the clinic and its users. It includes input from stakeholders, such as clinic staff and administrators, to ensure that the system addresses their challenges and enhances their workflows. For instance, the system should provide an intuitive interface for easy navigation and reduce manual paperwork by automating routine tasks. Additionally, compliance with legal and regulatory standards for handling medical data, such as patient confidentiality and data privacy, is a critical consideration. The section also highlights potential constraints, such as budget limitations and infrastructure challenges, and suggests strategies to address them, such as leveraging open-source technologies or cloud-based solutions. This comprehensive approach to requirements gathering ensures the system's effectiveness, usability, and long-term sustainability.

Design

This section focuses on the structural and visual blueprint of the Lying-In Clinic Information Management System for Buhi Municipality. It provides an overview of the system architecture, detailing how various components, such as the database, user interface, and processing modules, interact to deliver a seamless user experience. The design prioritizes simplicity and usability, ensuring that clinic staff can easily navigate the system without extensive technical training. Key elements include designing user-friendly dashboards for patient management, intuitive forms for data entry, and a streamlined process for generating reports. The database design is structured to securely store and retrieve patient information, medical records, and appointment schedules, ensuring data accuracy and integrity. This section also integrates design principles that align with the clinic's operations, allowing for efficient workflows and faster service delivery.

Additionally, the design considers scalability and flexibility to accommodate future enhancements, such as adding new features or expanding the system's capacity as the clinic grows. Wireframes, flowcharts, and system models are developed to visually represent the system's functionality and data flow, providing a clear guide for developers during the implementation phase. The section also includes considerations for responsive design to ensure the system works across multiple devices, such as computers, tablets, or smartphones, depending on the clinic's technological setup. By incorporating feedback from stakeholders during the design process, the system ensures alignment with user needs, contributing to its overall efficiency, reliability, and user acceptance.

Development

The Develop Phase of the Lying-In Clinic Information Management System refers to the actual construction and coding of the system based on the design specifications established earlier in the project. This phase involves translating the system's architectural design into a working software application. Developer writes the code using programming languages such as Java, Python, or PHP, depending on the system requirements and platform specifications. The development process is divided into creating individual modules for various functionalities, such as patient record management, appointment scheduling, inventory control, and decision support tools. Each module is carefully built to interact seamlessly with others, ensuring smooth data flow and integration within the system. During this phase, the database is also developed to store and manage critical patient and inventory data securely. Developer implements features like real-time data updates, automated alerts, and data retrieval mechanisms to enhance system efficiency. Additionally, rigorous testing and debugging are conducted throughout development to identify and fix any issues, ensuring that the system functions properly before deployment. Collaboration between developer and stakeholders, including clinic staff, plays a key role in fine-tuning the system to meet user needs and ensure that it is user-friendly, secure, and reliable for day-to-day operations.

Figure 4.8 – Patient Inquiry Interface

Figure 4.8 – Patient Inquiry Interface likely represents the section of the Lying-In Clinic Information Management System for Buhi Municipality that allows patients or healthcare providers to inquire about specific details related to patient records, appointments, or other healthcare services. This interface would enable users to quickly search for and retrieve information such as a patient's medical history, upcoming appointments, treatment plans, or test results. The interface would be designed to provide an easy-to-navigate and intuitive platform for accessing essential patient data, streamlining communication between healthcare providers and patients.

The Patient Inquiry Interface would likely include search and filter functionalities to make it easier to locate specific information, reducing the time spent on administrative tasks. Real-time updates would ensure that any changes in the patient's status, such as new test results or modifications to treatment plans, are immediately available for review. By providing an efficient way for both patients and providers to access important information, the interface helps improve decision-making, enhances patient engagement, and contributes to better overall healthcare delivery. This feature ultimately ensures that both patients and healthcare providers can stay informed and up to date with crucial health-related information.

Testing

The "Develop Phase" of the Lying-In Clinic Information Management System refers to the actual construction and coding of the system based on the design specifications established earlier in the project. This phase involves translating the system's architectural design into a working software application. Developers write the code using programming languages such as Java, Python, or PHP, depending on the system requirements and platform specifications. The development process is divided into creating individual modules for various functionalities, such as patient record management, appointment scheduling, inventory control, and decision support tools. Each module is carefully built to interact seamlessly with others, ensuring smooth data flow and integration within the system. During this phase, the database is also developed to store and manage critical patient and inventory data securely. Developers implement features like real-time data updates, automated alerts, and data retrieval mechanisms to enhance system efficiency. Additionally, rigorous testing and debugging are conducted throughout development to identify and fix any issues, ensuring that the system functions properly before deployment. Collaboration between developers and stakeholders, including clinic staff, plays a key role in fine-tuning the system to meet user needs and ensure that it is user-friendly, secure, and reliable for day-to-day operations.

Deployment

The Deployment Phase of the Lying-In Clinic Information Management System for Buhi Municipality focuses on delivering the completed system to its intended environment for actual use. This phase involves critical activities such as system installation, configuration, data migration, and initial testing in the live environment. The deployment process ensures that the system is fully functional and integrates seamlessly with the clinic's existing workflows. Key stakeholders, including IT experts and clinic staff, play an active role in overseeing the transition and verifying that all features operate as intended. User accounts are created, access privileges are assigned, and real-world scenarios are tested to ensure that the system supports essential operations, such as patient record management, appointment scheduling, and data security.

In addition to technical deployment, this phase includes training for end-users, such as clinic staff and administrators, to familiarize them with the system's functionalities. User manuals and support documentation are provided to help address any initial challenges during implementation. Monitoring and feedback mechanisms are established to identify and resolve potential issues post-deployment, ensuring a smooth adaptation to the new system.

The Deployment Phase is important for transitioning the system from development to practical use, ensuring it meets the operational needs of the clinic while maintaining reliability, usability, and security standards. This phase also sets the foundation for ongoing system maintenance and improvement based on real-world performance and user feedback.

Findings

During the development and after testing and evaluation of the developed system the following findings have been established:

1. The study successfully developed an Enhanced Patient Care System that integrates comprehensive patient records, including patient profiles, medical histories, test results, current medications, and treatment plans, while ensuring real-time updates for accuracy and accessibility.

2. The study effectively integrated optimized workflow efficiency by automating tasks such as appointment scheduling and patient documentation, thereby streamlining operations and reducing manual administrative work.

3. The study enhanced the inventory management system by implementing real-time tracking to ensure the availability of necessary supplies and setting automated alerts for low stock levels or approaching expiration dates to prevent shortages and enable timely reordering.

4. The study developed a system that supports clinical decision-making by providing decision support tools that utilize patient data and evidence-based guidelines for accurate treatment decisions, as well as using predictive analytics to anticipate patient needs, identify potential complications, and optimize resource allocation.

5. The study evaluated the system using ISO 25010 standards, confirming that it meets expectations in terms of functional

suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

Conclusions

Based on the findings of this study the following conclusions were formulated:

1. The study successfully developed an Enhanced Patient Care System that integrates comprehensive patient records with real-time updates, ensuring accurate and accessible information for improved healthcare delivery.
2. The system successfully enhanced workflow efficiency by automating tasks like appointment scheduling and patient documentation, leading to streamlined operations and reduced manual administrative work.
3. The system improved the inventory management system by incorporating real-time tracking and automated alerts,

ensuring the availability of supplies and preventing shortages through timely reordering.
4. The developed a system that enhances clinical decision-making by utilizing decision support tools and predictive analytics to improve treatment accuracy, anticipate patient needs, and optimize resource allocation.
5. The system using ISO 25010 standards and confirmed that it meets expectations across all key quality characteristics, including functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability, with an overall rating of 3.61, indicating that the developed system meets expectations.

Recommendations

Based on the conclusions drawn from this study, the following recommendations were formulated:

1. Continually update and maintain the Enhanced Patient Care System while exploring further integration with other healthcare systems to enhance data sharing and interoperability.
2. Expand the automation features further by incorporating additional tasks and processes to maximize workflow efficiency and reduce administrative burden.
3. Continuously monitor inventory trends and refine the real-time tracking and automated alert system to further optimize

supply levels and enhance the efficiency of reordering processes.
4. Further refine the decision support tools and predictive analytics to incorporate more diverse data sources, improving treatment accuracy and enhancing the system's ability to anticipate patient needs
5. Conduct regular evaluations based on ISO 25010 standards to ensure the system continues to meet expectations and to identify potential improvements in functionality, performance, and other key quality characteristics
6. Gather continuous feedback from end-users and stakeholders to identify any operational challenges or areas for enhancement, ensuring the system evolves

to meet changing healthcare needs and
technological advancements

References

1) Meyers, A. (Ed.). (2023). Digital Health Entrepreneurship. Springer.
2) Elkin, P. L. (Ed.). (2023). Terminology, Ontology, and Their Implementations. Springer.
3) Richesson, R. L., Andrews, J. E., & Hollis, K. F. (Eds.). (2023). Clinical Research Informatics. Springer.
4) Simon, G. J., & Aliferis, C. (Eds.). (2024). Artificial Intelligence and Machine Learning in Health Care and Medical Sciences: Best Practices and Pitfalls. Springer.
5) Rivas, H., & Boillat, T. (Eds.). (2023). Digital Health: From Assumptions to Implementations. Springer.
6) Electronic medical records (Unified Theory of Acceptance and Use of Technology). International Journal of Health and Information System, 2(2), 67-77. https://doi.org/10.47134/ijhis.v2i2.43
7) Nuraini, N., Febriyanti, B. A., & Wijayanti, R. A. (2023). Improvement strategy to reduce delay in returning inpatient medical records at Jenggawah Primary Health Center. International Journal of Health and Information System, 2(2), 78-85. https://doi.org/10.47134/ijhis.v2i2.44
8) Wening Saraswati, I., Khairunnisa, A. N., & Wijayanti, D. (2024). Development of hospital enteral formula for diabetes using tempeh flour with dragon fruit and tomato addition. International Journal of Health and Information System, 2(2), 92-100. https://doi.org/10.47134/ijhis.v2i2.48
9) International Journal of Healthcare Information Systems and Informatics. (2023). Annual progress report on healthcare informatics innovations. Scimago Journal Rank.
10) International Journal of Health and Information System. (2024). Exploring strategies for enhanced healthcare through integrated IT frameworks.
11) Abad, E., Bacungan, E., Llavore, D., Marzan, C., Marzan, R., & Songcuan, J. (2024). Don Mariano Marcos Memorial State University Medical Out Patient Records Management System: A Prototype. Journal of Innovative Technology Convergence, 6(1).
12) Abad, J. (2024). 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.
13) Abad, R. (2024). Medical Out-Patient Records Management System (MORMS) at Don Mariano Marcos Memorial State University. https://www.dmmmsu.edu.ph/morms
14) Abad, R. (2024). Medical Out-Patient Records Management System (MORMS) at Don Mariano Marcos Memorial State University. URL: https://www.dmmmsu.edu.ph/morms
15) ACSQHC (2024). Documenting Information. Documenting information | Communicating for Safety resource portal (safetyandquality.gov.au)
16) AHS (2024). Quality Medical Equipment in the Philippines. Improving Healthcare in the Philippines (avantehs.com)
17) Allianzcare (2024). Healthcare in the Philippines | Philippines Health Insurance | Allianz (allianzcare.com)
18) Asha (2024). Documentation in Health Care. Documentation in Health Care (asha.org)
19) Balocon, O. H., Dator, R. Y. B., Legrama, M. J. R., & Vicuña, A. R. (2024). WEB-BASED MATERNITY RECORD SYSTEM WITH APPOINTMENT AND BILLING FOR A LYING IN CLINIC IN LAGUNA. Ignatian International Journal for Multidisciplinary Research, 2(5), 1171-1182.
20) Batoon, J. A., et al. (2022). Robles Maternity Clinic System. International Journal of Advanced Trends in Computer Science and Engineering.
21) CG (2020). Maternity Clinic Management System Capstone Project. https://capstoneguide.com/maternity-clinic-management-system-capstone-project-document/
22) Dator, J. (2024). Challenges in Lying-In Clinics: A Study on Record Management and Patient Satisfaction. URL: https://www.datorclinicresearch.com
23) Dator, R. Y. B., Vicuña, A. R., Legrama, M. J. R., & Balocon, O. H. WEB-BASED MATERNITY RECORD SYSTEM WITH APPOINTMENT AND BILLING FOR A LYING IN CLINIC IN LAGUNA.
24) De Guzman, A. (2024). Health Records Management System for Rural Clinics. URL: https://www.deguzmanruralhealth.com
25) De Guzman, A. (2024). Health Records Management System for Rural Clinics. https://www.deguzmanruralhealth.com
26) Dela Cruz, J. (2023). Patient-Centered Care System for Clinics. https://www.delacruzpatientcare.com

27) Dela Cruz, J. (2023). Patient-Centered Care System for Clinics. https://www.delacruzpatientcare.com
28) Department of Health (DOH). (2023). Philippine Health Agenda: Universal Health Care.
29) DSWD (2024). Hospital Billing in the Philippines. MC_2016-014.pdf (dswd.gov.ph)
20. EAMC (2023). Health Information Management. https://eamc.doh.gov.ph/index.php/programs-and-projects/allied-health-professional/healthinformation-management-department
31) Engagebay (2024). Appointment Scheduling. What Is Appointment Scheduling? - Appointment Scheduling Definition | EngageBay Glossary
32) Epizitone, A., & Moyane, S. P. (2023). A systematic literature review of health information systems for healthcare. Healthcare, 11(7). https://doi.org/10.3390/healthcare11070959
33) FutureLearn (2024). An introduction to the healthcare system in the PhilippinesAn introduction to the healthcare system in the Philippines - FutureLearn
34) Ginamet (2022). Electronic Medical Records. Patient Management System (genamet.com)
35) Ginamet, E. (2023). EMR Systems for Clinics: A Digital Approach.
36) Gonzales, M. (2023). Automated Clinic Management System. https://www.gonzalesautomatedsystem.com
37) GovPh (2020). Community Health Tracking System. Community Health Information Tracking System (CHITS) – DAP
38) GovPh (2024). Health Information Management. HEALTH INFORMATION MANAGEMENT (doh.gov.ph)
39) ITA (2024). HealthCare in the Philippines. Philippines - Healthcare (trade.gov)
40) ITA (2024). Philippine Health IT. The Philippine Health IT (trade.gov)
41) Khang, A., Ragimova, N. A., Hajimahmud, V. A., & Alyar, A. V. (2022). Advanced technologies and data management in the smart healthcare system. In AI-Centric Smart City Ecosystems (pp. 261-270). CRC Press.
42) Lao, R. (2023). Maternal Health Information System. URL: https://www.laohealthsystem.com
43) Mujuru (2024). Appointments and Scheduling. 7 Benefits of Making Appointments and Scheduling in Business (linkedin.com)
44) Mygp (2024). Why is your medical history important? Why is medical history Important? - myGP
45) NLM (2024). Medical History. Chapter 2 Health History - Nursing Skills - NCBI Bookshelf (nih.gov)
46) Observe Smart (2024). The Importance of Medical Documentation and Monitoring. The Importance of Medical Documentation and Monitoring - ObservSMART
47) Okomeds (2024). 6 different types of medical documents. 6 different types of medical documents (okomeds.com)
48) Pérez, C. (2024). Telehealth System for Maternal Care. https://www.pereztelehealthsystem.com
49) PhilHealth (2022). ALL ACCREDITED HEALTH CARE PROVIDERS, PHILHEALTH MEMBERS, PHILHEALTH OFFICES (HEAD OFFICE AND REGIONAL OFFICES) AND ALL OTHERS CONCERNED. circ2022-0028.pdf (philhealth.gov.ph)
50) PLOS ONE. (2022). Understanding the impacts of health information systems on patient flow management: A systematic review. https://doi.org/10.1371/journal.pone.0274493
51) ROI (2024). Why is Appointment setting is Important? Appointment Setting vs Lead Generation | ROI CX Solutions (roicallcentersolutions.com)
52) Santos, P. (2023). Community Health Information System. https://www.santoscommunityhealth.com
53) Santos, P. (2023). Community Health Information System.: https://www.santoscommunityhealth.com
54) SCP Health (2024). 4 Reasons Why Proper Medical Record Documentation Is Vital - 'Think with Your Ink'. 4 main reasons documentation is important in healthcare (scphealth.com)
55) SHIJITHA, R. (2024). PREDICTIVE ANALYTICS FOR PATIENT MANAGEMENT SYSTEM USING IOT. Journal of Engineering & Technological Advances, 9(1), 90-104.
56) Shijitha, S. (2024). IoT-Based Patient Monitoring System.
57) Torres, L. (2024). Electronic Medical Record System for Local Health Units.: https://www.torreslocalhealth.com
58) Torres, L. (2024). Electronic Medical Record System for Local Health Units. https://www.torreslocalhealth.com
59) UTC (2024). The health care in the Philippines. Health care in the Philippines.

60) Wrike.com; The Agile Software Development Life Cycle; year published: 2020; date accessed: September 20, 2022; https://www.wrike.com/agile-guide/agile-development-life-cycle/

61) Xiaosong Zhang; Xiaofen Wang; Guowu Yang; Nadra Guizani; Xiaojiang Du (2020). Efficient and Traceable Patient Health Data Search System for Hospital Management in Smart Cities. Efficient and Traceable Patient Health Data Search System for Hospital Management in Smart Cities | IEEE Journals & Magazine | IEEE Xplore

62) Zaabar, B., Cheikhrouhou, O., Jamil, F., Ammi, M., & Abid, M. (2021). HealthBlock: A secure blockchain-based healthcare data management system. Computer Networks, 200, 108500.

63) Zaabar, F., et al. (2021). Blockchain in Healthcare: Enhancing EHR Security.

64) Zhang, X., Wang, Y., Yang, L., Guizani, N., & Du, X. (2024). Smart City Healthcare Systems.

affection have been a source of motivation and strength throughout this journey.

To her friends and colleagues, **Jicelle N. Arellano, Blenda Marie A. Tataro, Emmanuel Gabrielle C. Maninang, and Girlie M. Tuazon**, for their constant encouragement and support.

To her **Moralde family** - siblings, nephews, nieces, and in-laws - for their love, encouragement, and unwavering support throughout this endeavor.

A heartfelt **"THANK YOU!"** also goes out to all those whose contributions, though not specifically mentioned, were integral to the completion and success of this study.

To God be the Glory!

L. G. M. I.

***