



Electronic medical records in primary care facilities: Implication for health services delivery

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Abstract

This study examined the implementation of electronic medical records (EMRs) in Primary Care Facilities (PCFs) in the Province of Aklan, Philippines to assess their impact on health service delivery and alignment with health policy under the Universal Health Care (UHC) Act. Using a descriptive research design, data were collected through structured surveys involving 253 healthcare providers, Municipal Health Officers, nurses, midwives, and IT personnel or encoders. The findings indicate that EMRs significantly enhance data accuracy, accessibility, and care coordination. However, persistent barriers remain, including limited infrastructure, insufficient training, and concerns regarding data privacy and security. The study also revealed that most EMR-related responsibilities are carried out by IT personnel or encoders (28.85%), midwives (26.48%), and nurses (25.30%), with minimal engagement from Municipal Health Officers (5.93%). While the system performs strongly in terms of data integration and accessibility, the effectiveness of EMRs can be further optimized through targeted investments in technical infrastructure, expanded capacity-building, and comprehensive policy support. A key implication is the need for greater leadership involvement and institutional backing to ensure the sustainability and efficiency of EMR use in primary care. This study is limited to a single province, which may affect generalizability, but it offers critical insights for strengthening digital health systems in similar contexts.

Keywords: *electronic medical records, primary care, digital health, health policy, Universal Health Care, Aklan*

Article History:

Received: June 6, 2025

Accepted: August 15, 2025

Revised: August 10, 2025

Published online: September 5, 2025

Suggested Citation:

Diaz, M.T. (2025). Electronic medical records in primary care facilities: Implication for health services delivery. *Journal of Allied Health Sciences & Medical Research*, 1(3), 28-45. <https://doi.org/10.53378/jahsmr.353257>

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1. Introduction

Primary care facilities serve as the backbone of the Philippine health system as stipulated in the Universal Health Care (UHC) Act of 2019, playing a vital role in both data generation and the provision of early medical interventions (Shi, 2012; Giri & Din, 2025). These facilities are often the first point of contact for patients, making them crucial in ensuring accessible and equitable healthcare delivery. As gatekeepers of the health system, primary care facilities are responsible not only for providing immediate treatment but also for establishing and maintaining accurate patient records that form the foundation of long-term care. Proper documentation of patient histories, diagnoses, treatments, and follow-up visits ensures continuity of care and allows healthcare providers to make informed clinical decisions (Demsash et al., 2023; Mathioudakis et al., 2016; Ebbers et al., 2022).

Electronic Medical Records (EMRs), as digital systems for managing patient health information, have significantly transformed how medical data is documented, stored, and utilized across the globe. Their integration into healthcare practice enhances clinical efficiency, supports real-time decision-making, and ensures continuity of care, factors that are indispensable in modern health systems (Lee et al., 2025; Alexiuk et al., 2023; Goh et al., 2025; Saleh et al., 2025). According to the World Health Organization (2019) and Albagmi (2021), EMRs reduce redundancy, minimize medical errors, streamline workflows, and strengthen care coordination. These benefits highlight their potential to bridge systemic gaps in healthcare delivery, especially in resource-constrained environments.

In areas such as the Province of Aklan in the Philippines, where access to technology and connectivity is often uneven, EMRs offer a promising means to improve service delivery through effective data management and informed clinical decision-making. They also enable more robust health monitoring and disease surveillance, improve patient-provider communication, and contribute to cost efficiency by reducing administrative burden. By facilitating accurate and timely data collection, EMRs can further support public health initiatives and policy evaluation at both the local and national levels.

Nonetheless, the implementation of EMRs is not without challenges. Persistent barriers include limited infrastructure, gaps in digital literacy among healthcare workers, resistance to adopting new technologies, and growing concerns over data privacy and security (Alzghaibi et al., 2025; Hossain et al., 2025; Derecho et al., 2024; Jimma & Enyew, 2022). These issues

can hinder full adoption and reduce the potential impact of EMRs, particularly in rural and remote communities.

The purpose of this paper is to evaluate the implementation of EMRs in Primary Care Facilities (PCFs) in the Province of Aklan, Philippines. Specifically, it investigates their impact on healthcare service delivery and alignment with policy objectives under the Universal Health Care (UHC) Act. By assessing both the effectiveness and challenges of EMR adoption, this study contributes to ongoing discussions on digital health transformation in the Philippines. The findings aim to provide evidence-based insights for optimizing EMR use in primary care settings, thereby advancing national health goals and improving overall healthcare outcomes.

2. Literature review

2.1. Electronic Medical Records and Primary Healthcare Delivery

The adoption of EMRs in primary care facilities has gained increasing attention due to their transformative impact on healthcare service delivery. Globally, EMRs have demonstrated their potential to improve patient care by enhancing accuracy, data accessibility, and coordination among healthcare providers (Kumari & Chander, 2024; Torkman et al., 2025; Mugauri et al., 2025; Al-Shammari et al., 2024). In resource-constrained settings such as rural provinces in the Philippines, EMRs are particularly valuable for reducing redundancies, minimizing delays in patient care, and improving continuity of services (World Health Organization, 2019; Albagmi, 2021). These digital tools also enable data-driven decision-making, which is essential for effective health program planning, especially in geographically isolated and disadvantaged areas.

Despite these potential benefits, EMR implementation remains a complex and multifaceted challenge. The literature identifies common barriers, including inadequate infrastructure, poor internet connectivity, limited digital literacy, and resistance from healthcare workers (Bekele et al., 2024; Tsai et al., 2020; Derecho et al., 2024; Mwogosi & Kibusi, 2024). In the Philippine context, where healthcare is heavily influenced by decentralization, these challenges are often amplified due to variations in local government capacity, priorities, and resource allocation. Consequently, understanding EMR adoption in primary care requires not only a technological perspective but also consideration of human behavior, organizational processes, and governance structures. Addressing these dimensions

calls for a comprehensive theoretical framework to guide evaluation and identify strategies that are both context-specific and sustainable.

2.2. Theoretical Framework

The successful implementation of EMRs in primary care facilities is shaped by the interaction of multiple factors, including technological infrastructure, organizational processes, policy directives, and user acceptance. To analyze this complexity, this study adopts an integrated theoretical framework that combines four perspectives: Diffusion of Innovations Theory, Socio-Technical Systems Theory, Unified Theory of Acceptance and Use of Technology (UTAUT), and the Health Policy Analysis Framework. Together, these theories provide a multidimensional lens for understanding how EMRs are introduced, adopted, and sustained within healthcare systems.

The Diffusion of Innovations Theory by Rogers (2003) explains how innovations like EMRs spread within social systems. It identifies determinants such as relative advantage, compatibility, complexity, trialability, and observability (Zhang et al., 2015). In the case of Aklan's primary care system, this theory helps clarify how healthcare workers' perceptions of EMRs and the visibility of successful implementations influence their willingness to adopt the technology.

The Socio-Technical Systems Theory, articulated by Baxter and Sommerville (2011), emphasizes the interplay between technology and the social environment. According to this perspective, successful implementation depends on balancing system functionality with human usability. This underscores the importance of contextual adaptation through adequate training, workflow alignment, and user-centered system design. In rural and underserved areas like Aklan, involving end-users in the design and deployment process fosters stronger ownership, acceptance, and long-term sustainability of EMRs.

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003), further enriches this analysis by focusing on user-level determinants of technology adoption. It identifies performance expectancy, effort expectancy, social influence, and facilitating conditions as key drivers of behavioral intention (Venkatesh & Bala, 2008). This model is particularly useful for assessing healthcare providers' readiness to integrate EMRs into daily practice and highlights the critical role of institutional support and resource provision in sustaining adoption.

Finally, the Health Policy Analysis Framework by Buse et al. (2012) situates EMR implementation within broader governance and policy environments. This framework examines how policy content, processes, actors, and context shape health system outcomes. In the Philippines, this perspective is vital for understanding how universal healthcare (UHC) mandates, local government unit (LGU) support, and leadership engagement determine the success of digital health initiatives. In resource-limited contexts, political will and structural backing can significantly influence whether EMRs become fully integrated or remain underutilized.

By integrating these four theories, the framework offers a comprehensive analysis that spans both micro-level (individual and organizational) and macro-level (policy and systemic) determinants of EMR implementation. This multi-theoretical approach not only identifies barriers but also points to actionable strategies for enhancing EMR sustainability, scalability, and long-term impact on primary healthcare delivery.

3. Methodology

This study employed a descriptive research design, integrating both quantitative and qualitative approaches to assess the implementation of EMRs in primary care facilities across the Province of Aklan. The descriptive design was chosen to systematically capture the current status, effectiveness, and challenges associated with EMR adoption within real-world healthcare settings. Quantitative data were gathered through structured surveys, which provided measurable insights into system usability, staff training, and infrastructure readiness. In addition, a case study approach was incorporated to examine selected primary care facilities, enabling a contextualized understanding of EMR practices across both urban and rural settings. This approach provided nuanced insights into how local conditions shape adoption, implementation, and sustainability.

The study sample consisted of 253 participants including Municipal Health Officers (15), IT personnel (73), nurses (64), midwives (67), and other frontline health staff (34), selected through a combination of total enumeration and stratified random sampling to ensure representation across different facility types and service areas.

Table 1 shows the demographic characteristics of health providers assigned to EMRs in the primary care facilities of the Province of Aklan.

Table 1*Demographic characteristics of the health providers*

Characteristics	Frequency	Percentage
Education		
PhD Graduate	7	2.77
Master's Graduate	10	3.96
College Graduate	216	85.37
Other Relevant Certifications	20	7.90
Salary Grade		
Salary Grade 1 – 10	63	24.90
Salary Grade 11 – 20	125	49.41
Salary Grade 21 and above	15	5.93
Others	50	19.76
Years of Experience		
1 – 5 Years	101	39.92
6 – 10 Years	68	26.88
More than 10 Years	63	24.90
Others	21	8.30
Years in Service		
1 – 5 Years	119	47.03
6 – 10 Years	62	24.51
11 – 15 Years	36	14.23
Others	36	14.23
TOTAL	253	100%

Data were collected using a validated and pilot-tested questionnaire to guarantee both reliability and content validity. The instrument covered key domains such as demographic information, system implementation, and perceived challenges, with responses rated on a five-point Likert scale. For data analysis, quantitative responses were processed using descriptive statistics to summarize key trends, while inferential tests, including t-tests, ANOVA, and Pearson correlation, were applied to examine differences and relationships among variables. Qualitative data, on the other hand, were transcribed, coded, and subjected to thematic analysis, enabling the identification of recurring patterns and context-specific insights.

By combining quantitative rigor with qualitative depth, this comprehensive methodology facilitated the identification of critical factors influencing EMR success. Furthermore, the findings informed policy recommendations aligned with the objectives of the Universal Health Care (UHC) Act, highlighting strategies for strengthening digital health integration in the Philippine primary care system.

4. Findings and Discussion

Table 2 illustrates the distribution of health providers based on their training in EMR systems, highlighting the preparedness and skill levels of respondents in utilizing EMR technology effectively.

Table 2

Training and roles in EMR Systems of health providers

Indicators	Frequency	Percentage
Training in EMR System		
Basic Training on EMR	172	67.98
Advanced Training on EMR	5	1.98
Certification in EMR System	28	11.07
No Formal Training	40	15.81
Others	8	3.16
Roles in EMR Management		
Data Entry and Encoding	205	81.03
System Administration	9	3.56
Technical Support	12	4.74
Policy Compliance Monitoring	8	3.16
Others	19	7.51
T o t a l	253	100

The findings reveal that a significant portion of the healthcare workforce has limited exposure to advanced EMR training or certifications. This lack of specialized preparation may hinder their proficiency in managing the system and restrict their ability to maximize its potential. These results underscore the need for continuous professional development and targeted training programs that enhance the technical and managerial capabilities of healthcare providers. Strengthening human resource competencies is essential to ensure not only the effective implementation of EMRs but also their long-term sustainability in primary care facilities.

With respect to the roles assumed in EMR management, the distribution of responsibilities reflects the multi-faceted nature of digital health systems within primary care. The predominance of data entry and encoding (81.03%) and technical support (4.74%) highlights the operational focus of these facilities, where the immediate priority lies in

recording, storing, and managing patient information. While these roles are critical to day-to-day functionality, the minimal representation of system administrators (3.56%) and policy compliance monitoring (3.16%) reveals significant gaps in knowledge transfer, oversight, and regulatory adherence. Such limitations could compromise system efficiency, data integrity, and the alignment of EMR use with national standards and policies. The relatively low involvement of personnel in system administration and compliance monitoring further suggests vulnerabilities in system security, governance, and long-term maintenance. Without dedicated staff for these functions, issues related to data privacy, user accountability, and adherence to health information regulations may be overlooked.

To address these gaps, capacity-building initiatives, role-specific training, and adequate staffing support must be prioritized. Clearly defined responsibilities for technical administration, compliance monitoring, and data governance are essential to complement frontline data management roles. Moreover, investing in continuous training not only improves system usability but also strengthens institutional resilience against technological and organizational challenges.

By bridging these role and skills gaps, primary care facilities in Aklan can optimize EMR functionality, enhance service efficiency, and improve the overall quality of healthcare delivery. More importantly, such measures contribute to the sustainability of EMR systems, ensuring their alignment with the broader goals of the Universal Health Care (UHC) Act and the digital transformation of the Philippine health system.

Table 3

Level of implementation of electronic medical records

Indicators	Average Weighted Mean	Interpretation
System Integration	4.28	Fully implemented
Accuracy and Completeness	4.32	Fully implemented
Accessibility of Records	4.27	Fully implemented
User's Satisfaction	4.25	Fully implemented

The data in Table 3 indicate that the EMR system is performing well across several critical dimensions, reflecting both effectiveness and high levels of user satisfaction.

In terms of system integration, the EMR has been successfully embedded within other healthcare management platforms, significantly enhancing its overall functionality. Its ability

to consolidate patient records and support interoperability ensures that comprehensive medical histories are accessible across multiple healthcare units, thereby promoting continuity of care. This strength is reflected in the high average mean score of 4.28, confirming that the system is not only fully implemented but also operating seamlessly within the broader healthcare infrastructure.

With respect to accuracy and completeness, the EMR system demonstrates robust performance in ensuring the precise entry, storage, and retrieval of patient information. By minimizing data errors, the system reduces the likelihood of medical mistakes and fosters reliable patient record management. Moreover, the comprehensive documentation of diagnoses, treatments, and patient histories further strengthens its credibility and clinical utility. The mean score of 4.32, the highest among the evaluated areas, underscores that this function is not only fully operational but also highly effective in meeting the fundamental requirements for trustworthy medical records.

The evaluation of accessibility of records highlights another strong area of performance, with healthcare professionals reporting ease of access to patient information across different units and efficiency in record retrieval. However, occasional system downtime has been noted as a limitation, potentially disrupting timely access to records during critical moments. This concern is reflected in a slightly lower mean score of 4.27, suggesting that while the system is generally reliable, further technical refinements, such as improved server capacity, stronger IT support, or backup systems, are needed to mitigate disruptions and ensure consistent availability.

The dimension of user satisfaction reveals that healthcare providers are generally pleased with the EMR system. Users report that the platform is intuitive and user-friendly, while training programs and technical support are viewed positively. Importantly, respondents note that the system contributes to reducing workload and improving efficiency in daily operations. The mean score of 4.25 reinforces this perception, indicating widespread acceptance among staff. Nevertheless, maintaining this level of satisfaction requires ongoing user training, continuous technical assistance, and regular updates to adapt to evolving clinical and administrative needs.

Taken together, these findings suggest that the EMR system is fully implemented and functioning effectively across the studied facilities. Its integration, data accuracy, and user acceptance all point to a well-established digital platform that significantly enhances healthcare

delivery. Addressing the residual issue of occasional system downtime and sustaining long-term user support will be crucial in further strengthening the system. Overall, the EMR system's demonstrated success underscores its potential to serve as a cornerstone of digital health transformation in Aklan's primary care services, aligning with the objectives of the Universal Health Care (UHC) Act and setting a precedent for broader implementation across the Philippine health system.

Table 4

Issues encountered in the electronic medical records in the Province of Aklan

Indicators	Average Weighted Mean	Interpretation
Technical Challenges	4.03	Often
User's Competence	4.08	Often
Data Privacy Concerns	4.18	Often
Infrastructure Limitations	4.10	Often

The data provide a comprehensive assessment of the technical challenges, user competence, data privacy concerns, and infrastructure limitations affecting the implementation and use of the EMR system in primary healthcare facilities. Overall, the results reveal a consistent trend of “often” across all categories, with mean scores indicating that these issues occur frequently and significantly shape the day-to-day functioning of the system.

The mean score of 4.03 highlights that technical challenges, including system downtimes, crashes, and the inadequacy of IT infrastructure, are recurring obstacles. These issues undermine the reliability of the EMR system and disrupt its effectiveness in clinical settings. Additionally, difficulties in maintaining data integrity during system updates and the lack of efficient troubleshooting mechanisms reflect the need for more robust technical infrastructure and stronger support services. While the system remains operational, the persistence of such challenges suggests that further investment in IT infrastructure, resilient system design, and enhanced technical support mechanisms is crucial for ensuring reliability and continuity of care.

In terms of user competence, the mean score of 4.08 suggests that although healthcare providers are generally familiar with EMR functionalities, recurring problems persist. Training programs have been implemented; however, gaps remain in users' ability to troubleshoot minor issues independently and adapt to system updates. These recurring challenges highlight the

need for comprehensive and continuous capacity-building initiatives to improve technical proficiency and ensure consistent accuracy in data input. Strengthening user competence would not only reduce dependence on IT personnel but also foster greater confidence and efficiency among healthcare workers in utilizing EMRs.

Data privacy concerns emerge as the most pressing issue, reflected in a mean score of 4.18. Despite the adoption of encryption protocols and compliance with national data privacy regulations, vulnerabilities remain, particularly in preventing unauthorized access and ensuring strict adherence to data protection practices. These concerns underscore the necessity of strengthening security protocols, enhancing user awareness through targeted training, and instituting continuous compliance monitoring. Given that patient trust is central to effective healthcare delivery, addressing data privacy is paramount to sustaining EMR adoption and legitimacy.

Finally, infrastructure limitations remain a critical barrier, with a mean score of 4.10. Inadequate hardware, unreliable internet connectivity, and insufficient backup systems are frequent concerns, particularly in rural areas where power supply and digital infrastructure are less stable. These deficiencies compromise the smooth operation of the EMR system and hinder its capacity to function as a reliable healthcare management tool. Targeted investments in infrastructure upgrades, such as reliable internet services, adequate hardware, and robust backup solutions, are necessary to ensure system efficiency, safeguard data, and support uninterrupted healthcare delivery.

The analysis of technical, human, organizational, and infrastructural factors illustrates that while the EMR system is functional, recurring challenges limit its overall efficiency and sustainability. Addressing these gaps requires a multifaceted approach: strengthening technical support, providing continuous role-specific training, fortifying data security measures, and upgrading digital infrastructure. Implementing these measures would not only enhance the performance of the EMR system but also improve its long-term impact on healthcare delivery, particularly in the context of primary care services in Aklan.

The results of the Spearman's rho correlation analysis in Table 5 reveal a correlation coefficient of -0.6 between the level of implementation and the issues encountered. This negative value suggests an inverse relationship, indicating that as the level of implementation increases, the number of issues encountered tends to decrease. However, the magnitude of this correlation points to only a moderate relationship rather than a strong one.

Table 5*Test of significant relationship*

	Spearman's rho	Level of Implementation	Issues Encountered
	Correlation Coefficient	1	-0.6
Level of Implementation	Sig. (2-tailed)		0.4
	Interpretation		Not Significant
	Decision		Accept Hypothesis
	Correlation Coefficient	-0.6	1
Issues Encountered	Sig. (2-tailed)	0.4	
	Interpretation		Not Significant
	Decision		Accept Hypothesis

The corresponding significance value (Sig. = 0.40) indicates that the correlation is not statistically significant at the conventional alpha level of 0.05. This finding suggests that the observed relationship may be attributable to random variation rather than a true association within the population. In other words, while the data hint at a trend where higher levels of implementation might reduce issues, the evidence is insufficient to establish this relationship as statistically meaningful.

Given the lack of statistical significance, the decision is to accept the null hypothesis. This means that there is no sufficient evidence to reject the assumption that the level of implementation and the issues encountered are unrelated. Therefore, it is concluded that, in this context, the Level of Implementation of the EMR system does not significantly correlate with the Issues Encountered.

5. Conclusion

This study investigated the implementation of Electronic Medical Records (EMRs) in primary care facilities in the Province of Aklan, with a focus on their impact on healthcare service delivery and alignment with the Universal Health Care (UHC) framework. Findings revealed that EMRs significantly improved the accessibility, accuracy, and coordination of patient data, thereby enhancing continuity of care and service efficiency. However, challenges such as inadequate infrastructure, inconsistent user training, limited engagement of decision-makers, and persistent data privacy concerns continue to hinder the full realization of EMRs' transformative potential.

The study emphasizes that EMRs should not be viewed merely as technological tools, but as integrated health system innovations that reshape how healthcare is delivered and managed. Their successful implementation requires more than hardware or software upgrades; it demands an enabling policy environment, organizational readiness, continuous capacity-building, and sustained technical support. While frontline personnel such as IT staff, nurses, and midwives carry the bulk of operational responsibilities, the limited involvement of key decision-makers like Municipal Health Officers highlights a governance gap that must be addressed to ensure long-term sustainability.

Based on the findings, the study puts forward the following policy and practice recommendations:

A. Hardware Infrastructure

Policy Measures:

Conduct regular assessments of the availability and functionality of essential EMR equipment (e.g., computers, printers).

Evaluate internet reliability and speed, with priority upgrades for geographically isolated and disadvantaged areas.

Implement robust data backup solutions to prevent information loss from system crashes or technical failures.

Ensure power stability by providing backup power systems in rural healthcare facilities.

Establish a systematic process for the maintenance, upgrading, and replacement of EMR-related infrastructure.

Expected Outcome:

Improved adequacy, reliability, and sustainability of infrastructure, ensuring continuous and secure EMR operations in primary healthcare facilities.

B. Human Factor

Policy Measures:

Clearly define EMR-related roles, including data entry, technical support, system administration, and policy compliance.

Institutionalize targeted training programs to strengthen competencies in EMR management, oversight, and regulatory adherence.

Increase staffing support for system administration and compliance monitoring to enhance governance and sustainability.

Implement regular upskilling programs on emerging digital health technologies to ensure personnel remain competent.

Conduct periodic assessments of workforce competencies to identify gaps and provide tailored interventions.

Expected Outcome:

Enhanced workforce capability and role clarity, leading to more effective EMR management, stronger governance, and long-term sustainability of digital health systems.

C. System Functionality

Policy Measures:

Ensure interoperability with other healthcare platforms to promote continuity of care and efficient data sharing.

Enforce strict data entry protocols and conduct regular audits to reduce errors and maintain comprehensive patient records.

Address system downtime through proactive maintenance, timely updates, and infrastructure upgrades.

Provide continuous user training and responsive technical support to increase confidence and maximize system efficiency.

Conduct periodic performance evaluations to identify functional gaps and implement timely system improvements.

Expected Outcome:

Sustained effectiveness, reliability, and user satisfaction with EMRs, ensuring their integration into routine healthcare delivery.

While this study provides valuable insights, its geographic focus on Aklan limits the generalizability of findings to other regions. The reliance on self-reported data may also introduce potential bias. Future studies could explore longitudinal outcomes of EMR adoption, conduct comparative analyses across provinces or regions, and assess the cost-benefit implications of EMR implementation to inform broader national digital health strategies.

This study contributes to the growing body of evidence supporting EMRs as a strategic tool for strengthening local health systems. With the right combination of technological

resources, policy support, and stakeholder engagement, EMRs can serve as a cornerstone for achieving more equitable, data-driven, and responsive healthcare systems in the Philippines.

Disclosure statement

No potential conflict of interest was reported by the author.

Funding

This work was not supported by any funding.

Institutional Review Board Statement

This study was conducted in accordance with the ethical guidelines set by the Northwestern Visayan Colleges. The conduct of this study has been approved and given relative clearance by Northwestern Visayan Colleges.

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