

A REVIEW OF THE E-MEDICAL RECORDS POLICY IMPLEMENTATION ON HEALTHCARE SERVICE DELIVERY IN LAGOS STATE GENERAL HOSPITALS

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Abstract

The implementation of electronic medical records (EMRs) has emerged as a cornerstone of global health system modernisation, since it enhances healthcare delivery through improved efficiency, data quality, and patient outcomes. This empirical research examines the implementation of the e-medical records policy in general hospitals in Lagos State, Nigeria, focussing on healthcare service delivery from 2018 to 2024. The study consolidates findings from peer-reviewed articles, governmental and policy documents, and practical case studies through a systematic review methodology. The study reveals that the introduction of EMR in general hospitals across Lagos State has significantly enhanced operational efficiency, data accuracy, clinical coordination, and patient safety. Robust policy support, incremental implementation strategies, capacity-building initiatives, and stakeholder engagement serve as critical facilitators. The study highlights persistent challenges, such as restricted interoperability, data privacy concerns, finance limitations, infrastructural barriers, and employee resistance to change. The article concludes with recommendations to expand technical infrastructure, sustain programs, improve data governance, and support sustainable financing. The Lagos State example underscores the necessity for flexible policies, collaborative collaborations, and continuous innovation to fully harness the advantages of EMS in resource-limited settings, providing instructive insights for other regions aiming to enhance digital health.

Keywords:

Digital Health, Electronic Medical Records, Healthcare Service Delivery, Lagos State, Policy Implementation

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Introduction

The rapid digitisation of healthcare systems globally has fundamentally transformed patient information management, clinical processes, and overall healthcare delivery. Digital representations of patients' paper charts, known as Electronic Medical Records (EMRs), have

emerged as a focal point in this transformation due to their potential to improve efficiency, data accuracy, and treatment quality (World Health Organisation, 2021). The initiative to modernise service delivery and address persistent inefficiencies in the health sector involves the implementation of EMR policies in public healthcare institutions, such as general hospitals, particularly in developing countries like Nigeria, with a focus on Lagos State (Ogunyemi et al., 2022).

Lagos State, recognised as Nigeria's commercial hub and the most populous state, has a significant and rapidly expanding population, with estimates between 16 and 22 million individuals. It operates a substantial network of general hospitals serves as primary points of contact for many residents (various sources, e.g., World Population Review, Macro-trends, and Lagos State Government). The transition from paper-based to electronic records in Lagos State general hospitals has encountered various challenges, such as infrastructure limitations, staff resistance, inadequate training, and issues related to data privacy and security (Ogunleye et al., 2022). The effectiveness of e-learning is contingent upon the governing policy framework, resource availability, and the specific contextual factors within the healthcare environment.

This paper provides an empirical review of the implementation of e-medical records policies and their impact on healthcare service delivery in general hospitals in Lagos State. This review evaluates the achievements, challenges, and insights gained from the current endeavour of EMR adoption through an analysis of recent literature, policy documents, and empirical studies. The findings are intended to inform practitioners, healthcare managers, and legislators regarding optimal practices and areas needing improvement, thus facilitating the sustainable digital transformation of Lagos State.

Conceptual Review

The healthcare industry in Lagos State has undergone numerous changes aimed at improving the quality, accessibility, and efficiency of healthcare services. Lagos, the most populous state in Nigeria, is home to over 20 million residents and operates an extensive network of general hospitals that serve as primary points of contact for many individuals (National Population Commission, 2023). The growing population and increasing disease burden have significantly strained the existing healthcare system, exposing deficiencies in resource allocation, health information management, and service delivery (Akinyemi et al., 2021).

Nigerian healthcare facilities have historically utilised paper-based medical records for the management of patient data. This method is associated with several limitations, such as missing records, data duplication, incomplete documentation, and delays in accessing patient information (Ogunyemi et al., 2022). These challenges have occasionally led to compromised patient safety, suboptimal clinical decision-making, and impeded efforts towards coordinated, evidence-based treatment.

The Nigerian government, in collaboration with state governments and international development partners, has prioritised digital health technologies to enhance health systems,

acknowledging existing constraints. In 2016, the Federal Ministry of Health initiated the National Health ICT Strategic Framework to articulate its vision for enhancing health outcomes through the application of information and communication technology (ICT) (Federal Ministry of Health, 2016). Lagos State, recognised for its advancements in health sector innovation.

The state has developed its own digital health strategies, with a particular emphasis on electronic medical records (Lagos State Ministry of Health, 2023). The implementation of E-medical Services (EMS) in general hospitals in Lagos State represents a component of a broader digital transformation initiative designed to enhance healthcare delivery and conform to international best practices. The design seeks to grant authorised healthcare professionals immediate access to comprehensive patient data, improve documentation accuracy, minimise medical errors, and promote care continuity, thereby supporting the pursuit of universal health coverage and enhancing health outcomes (Bamgboye et al., 2022).

Electronic Medical Records (EMRs) possess significant potential to transform healthcare service delivery. However, their successful implementation relies not only on technological infrastructure but also on supportive policies, qualified personnel, and effective change management strategies, alongside a solid technical foundation. The Lagos State government is dedicated to e-health initiatives, leading to various pilot projects and scaling efforts in general hospitals, which have experienced both successes and challenges (Ogunleye et al., 2022). Assessing the influence of EMRs on healthcare service delivery and informing future policy directions requires an understanding of the contextual factors involved, including socioeconomic, organisational, and technological dimensions.

National Policy Frameworks

Nigeria's content is anchored by federal policies and strategic frameworks. Proposing a framework for the application of information and communication technology to enhance the health system (Federal Ministry of Health, 2016). The National Digital Health Policy 2021-2026, established subsequent to the prior framework, emphasises interoperability, data governance, patient privacy, and the integration of digital health solutions into standard healthcare delivery (Federal Ministry of Health, 2021). These national policies serve as a framework for guiding EHR deployment and outline the trajectory for state-level initiatives. Standards for EMR architecture, data security, and interoperability are crucial given Nigeria's varied health system landscape and the necessity for efficient data exchange across different care levels.

Initiatives in Lagos State healthcare policy

Lagos State has systematically developed and refined its digital health policies to establish a robust foundation for the deployment of EMR in its general hospitals. The primary policy document guiding these initiatives is the Lagos State Digital Health Strategy (2023). This approach outlines a vision for a fully digital health system that leverages modern information technologies to enhance accessibility, quality, and efficiency in healthcare delivery.

The key components of the policy initiatives indicate that Lagos State has adopted a phased strategy for EMS deployment, acknowledging resource constraints and the necessity for capacity enhancement. Initial pilot programs in select general hospitals facilitated the identification of issues and the development of context-specific solutions prior to larger scale implementation.

Stakeholder Engagement: The policy emphasises the involvement of key stakeholders, including hospital managers, clinicians, IT professionals, patients, and private sector partners, during the design, implementation, and evaluation stages. This participatory strategy aims to foster stakeholder engagement, ensure the system meets user requirements, and promote sustainability (Lagos State Ministry of Health, 2023).

Public-Private Partnerships (PPPs) represent collaborative agreements between government entities and private sector companies aimed at delivering public services or infrastructure projects. These partnerships leverage resources, expertise, and innovation from both sectors to achieve mutual benefits and enhance efficiency in project execution. The Lagos State government actively seeks partnerships between technology companies and development partners to enhance technical knowledge, funding, and innovation capacity. Public-private partnerships have enabled the customisation of emergency medical services systems, accomplished system integration, and offered technical support. Capacity building is central to the policy, emphasising continuous professional development through regular training courses and certification programs aimed at enhancing digital literacy and familiarising healthcare professionals with EMS capabilities. Administrative and clinical staff are essential for achieving comprehensive system adoption.

Monitoring, Evaluation, and Learning (MEL): The policy establishes frameworks for ongoing evaluation of EMR projects. Regular data collection on performance indicators, user feedback, and periodic policy discussions facilitate ongoing policy enhancements (Lagos State Ministry of Health, 2023).

Legal and regulatory framework

The legal framework for the implementation of electronic information systems in Lagos comprises several layers. The Nigeria Data Protection Regulation (NDPR) 2019 provides comprehensive federal guidelines regarding the collection, processing, and storage of personal data, including specific clauses for sensitive health data. All EMR systems implemented in general hospitals in Lagos are required to comply with the NDPR.

The Lagos State Health Law empowers the Ministry of Health to oversee all health information systems and ensure adherence to relevant standards. The legislation facilitates the establishment of data governance boards within hospitals, which are responsible for ensuring data quality, privacy, and security. The state's legal system endorses the adoption of international standards, including HL7 and ICD-10, for health data management, thereby

enabling future integration with national and regional health information exchanges (Adeleke et al., 2021).

Framework of Institutions

The Lagos State Ministry of Health has established a comprehensive institutional framework to facilitate the EMR application. This section addresses the Digital Health Directorate. This specialised unit within the ministry concentrates on digital health transformation and encompasses projects associated with Emergency Medical Services (EMS). Each ministry hospital possesses a Health Information Management Unit (HIMU) tasked with overseeing daily EMS operations, resolving technical issues, and providing training for new users.

Technical Working Groups: Multi-stakeholder groups comprising IT experts, clinicians, managers, and policymakers are formed to address emerging issues and foster innovation. Partnerships with academic and research policymakers. Partnerships with academic and research organisations enhance evidence-based policy updates and contribute to the development of a qualified digital health professional workforce, enabling ongoing evaluation of EMR effectiveness (Dunyemi et al., 2022).

Gaps in Policy and Implementation

Notwithstanding the presence of a comprehensive policy framework, various challenges in implementation persist. Numerous hospitals face challenges related to unreliable electricity supplies and inadequate internet connectivity, resulting in interruptions in data synchronisation and electronic medical record operations. Initial donor-supported pilots have demonstrated value; however, the expansion of EMRs in all general hospitals necessitates ongoing funding for hardware, software, maintenance, and training (Bamgboye et al., 2022).

Modification Resistance to change is often rooted in apprehensions regarding heightened workload or unfamiliarity with digital systems. The policy addresses these challenges through targeted change management initiatives; however, cultural transformations require time to implement. The integration of electronic health records with legacy systems and other digital health platforms, including laboratory information systems and pharmacy management systems, remains a work in progress. The lack of universal data standards can impede the efficient flow of information. Ensuring the accuracy, completeness, and security of patient data presents a continual challenge, particularly in light of cyber threats and the necessity for regular software updates and security audits. The sustainability strategy highlights the necessity for consistent government budget allocations and the mobilisation of domestic resources (Adeleke et al., 2022; Bamgboye et al., 2022). Lagos State policy addresses these issues by promoting small-scale investments in ICT infrastructure, education, and mentorship, implementing a small-scale governance system, enhancing financial resources, and exploring models that collaborate with foreign entities.

Methodology

This empirical investigation utilises a methodology that guarantees rigour, transparency, and reproducibility. This review integrates existing literature, policy documents, and empirical research to offer a comprehensive examination of the implementation of electronic medical records (EMR) policy and its impact on healthcare service delivery within general hospitals in Lagos State.

Methodological Framework

This paper concentrated on a qualitative study, examining policy documents and grey literature published from January 2018 to April 2024; a systematic literature review methodology was employed. We have chosen the year 2024 to compile the latest data and policy developments pertinent to the adoption of electronic medical records in Lagos State and the broader context of digital health transformation.

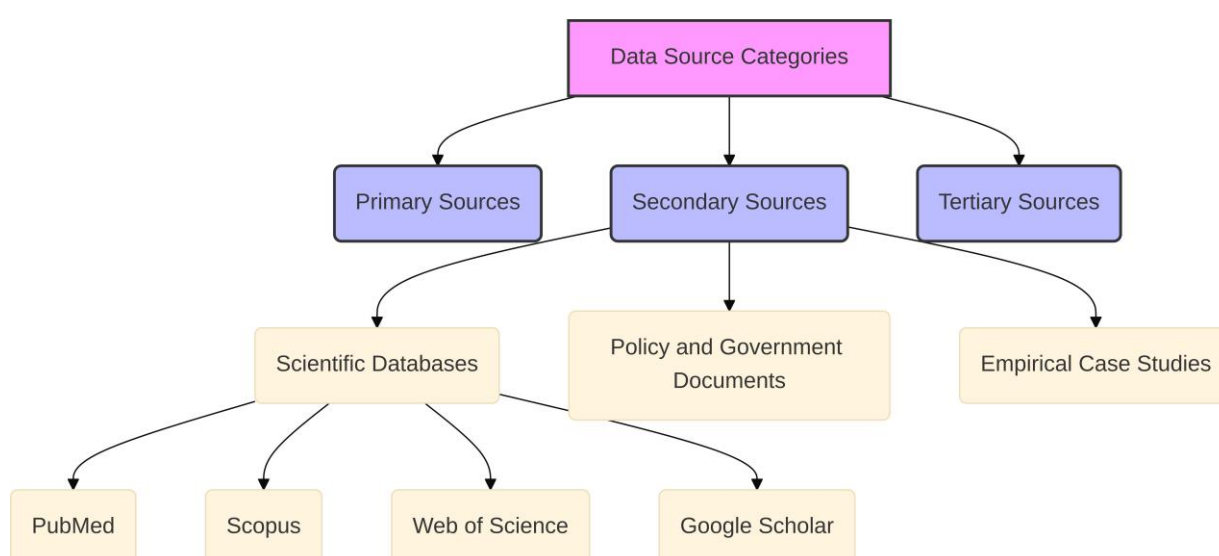
Examination of Data Origins and Inquiry Strategies

The section "Data Sources and Search Plans" thoroughly delineates the approach for pinpointing and obtaining pertinent literature for the review. This multifaceted strategy enriches the depth and dependability of the results.

Sources of Information

The analysis utilises a wide array of data sources, systematically organised to guarantee comprehensive coverage, encompassing both scholarly and practical viewpoints. The methodology's strength lies in its capacity to transcend the confines of peer-reviewed literature, incorporating essential policy documents and grey literature that frequently harbour the most contemporary and contextually relevant information.

Diagram: Data Source Categories



Description of Data Source Categories

Scientific databases are essential for locating peer-reviewed academic research. PubMed focusses on biomedical and health-related literature, rendering it suitable for health informatics research. Scopus and Web of Science provide a broad, multidisciplinary perspective, encompassing associated areas such as technology, public policy, and management. Google Scholar This resource is significant due to its comprehensive coverage, encompassing preprints, theses, and a wider array of academic works, thereby effectively connecting peer-reviewed literature with certain types of grey literature. Policy and government documents are essential for comprehending the official frameworks, strategies, and performance reports associated with digital health in Nigeria, specifically in Lagos State. Lagos State Ministry of Health Access to local digital health strategies and annual performance reports is direct. The Federal Ministry of Health formulates national policies and strategic frameworks, thereby establishing a comprehensive context. The National Information Technology Development Agency (NITDA) is essential for comprehending data protection regulations (NDPR), which are vital for the implementation of electronic medical records (EMR). Development agencies, both local and global, offer practical insights, case studies, and reports from organisations engaged in digital health initiatives. Reports from WHO, USAID, and NGOs frequently address practical implementation challenges, successes, and evaluations that are not consistently present in academic literature. Grey literature encompasses unpublished or non-commercially published materials, addressing significant gaps in available information. Technical reports, conference proceedings, and academic dissertations frequently include current research, preliminary findings, and comprehensive technical analyses that may not yet appear in peer-reviewed journals. This is of considerable significance in the fast-changing domain of digital health.

The selected keywords are thorough and strategically selected to encompass multiple aspects of EMR implementation and policy within the Nigerian context. The application of "OR" for synonyms and related terms ("electronic medical records" OR "EMR") and "AND" for the combination of distinct concepts ("Lagos State" AND "policy implementation") constitutes a standard methodology for efficient database searching.

Table 1: Keyword Combinations and Purpose

Keyword/Phrase	Purpose
"electronic medical records" OR "EMR"	Identifies core subject matter.
"performance of policies"	Focuses on the implementation and effectiveness of policies.
"Lagos State"	Specifies the primary geographical area of interest.
"general hospitals"	Narrows the focus to the specific type of healthcare facility.
"digital health"	Broader term to capture related initiatives and technologies.
"Nigerian healthcare service delivery"	Contextualizes EMRs within the national healthcare system.

“Electronic medical records” or “EMR” identifies the core subject matter. “Performance of policies” focusses on the implementation and effectiveness of policies. "Lagos State" identifies

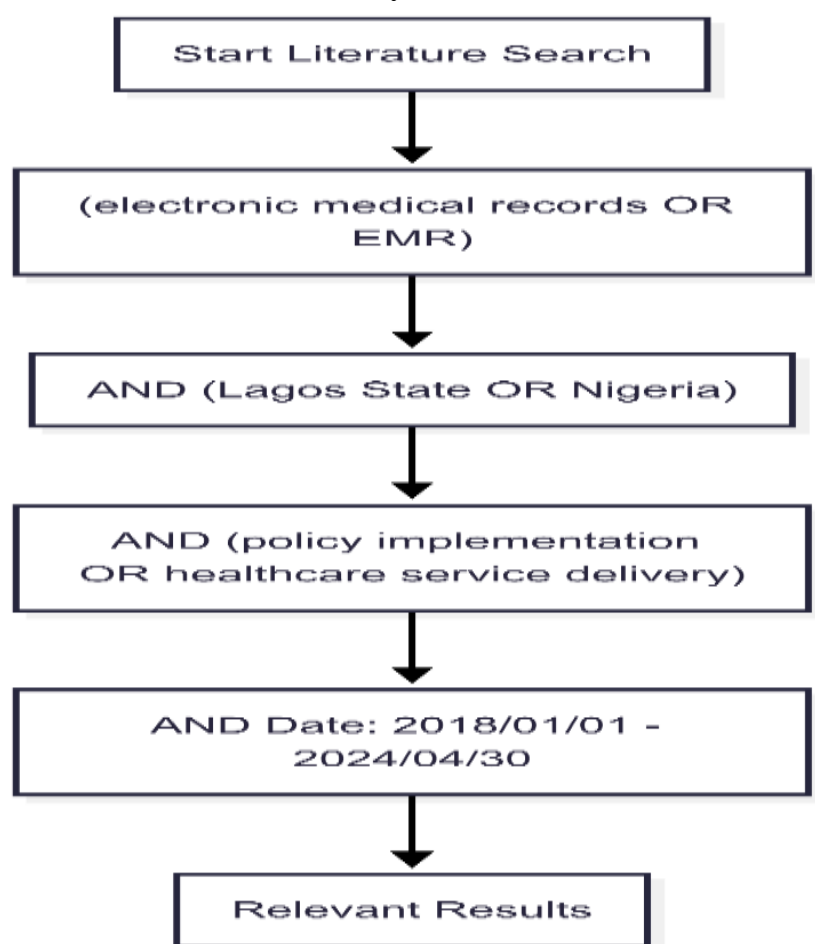
the main geographical focus of the study. General hospitals Concentrates on a particular category of healthcare facility. "Digital health" is an overarching term that encompasses various related initiatives and technologies. Nigerian healthcare service provision Situates electronic medical records within the framework of the national healthcare system. Health information systems Encompasses the wider systems of which EMRs are a component.

Example of a PubMed Search Query

The given PubMed search query example illustrates a structured and precise search string. Analysis of PubMed Search Query: This implements a date restriction (inclusion criteria), ensuring that the literature retrieved is current and pertinent to recent developments.

Illustration:

Framework of a Search Query



This diagram illustrates the logical combination of the "AND" and "OR" operators with keywords and date range to filter search results.

Standards for Exclusion and Inclusion

The criteria are essential for delineating the review's scope and ensuring the inclusion of only pertinent and high-quality studies.

Their comprehension of the study's limitations is evident.

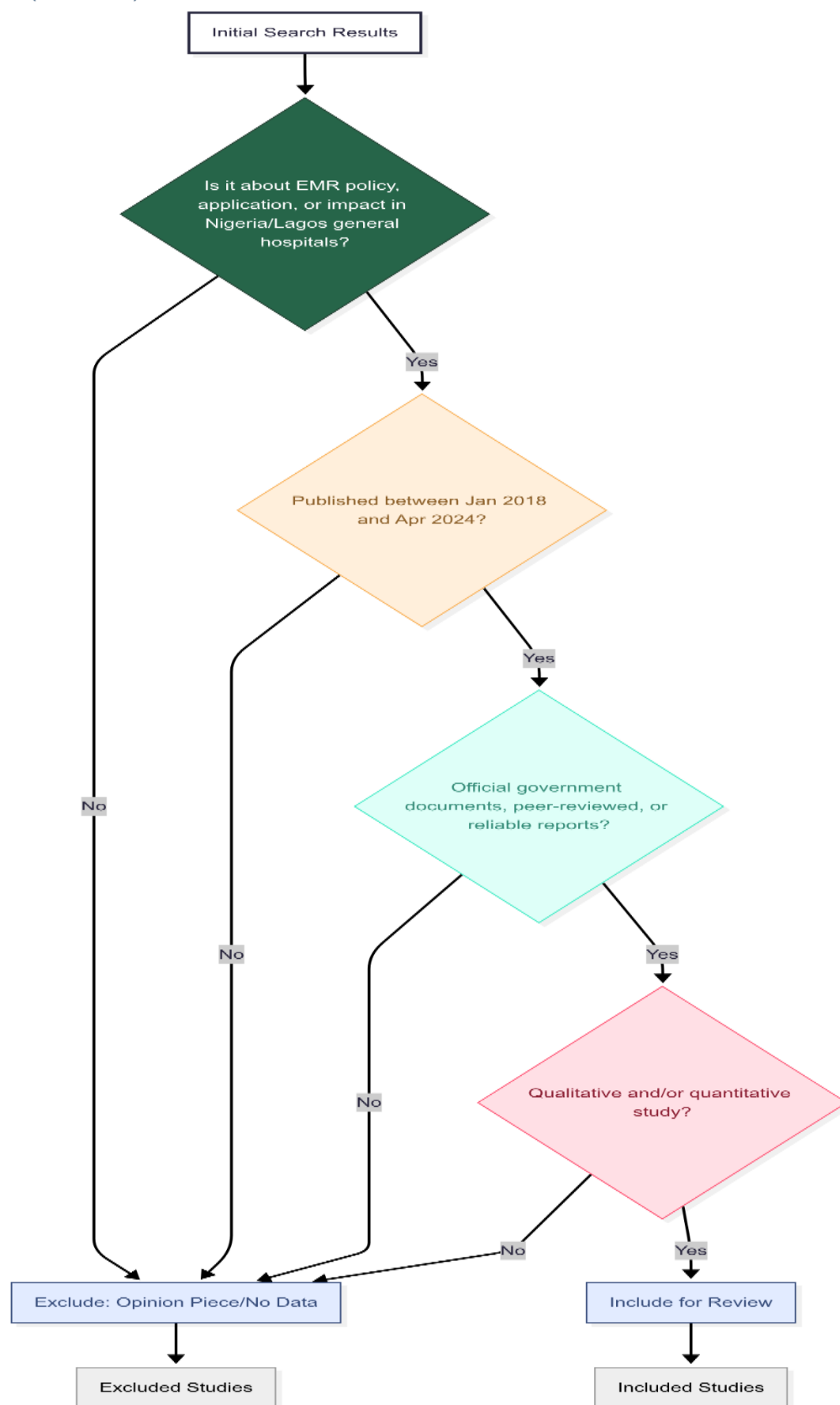


Figure: Flow of Inclusion and Exclusion Criteria

Code snippet Comprehensive Analysis: Criteria for Inclusion: The focus is geographically confined to Nigeria, particularly general hospitals in Lagos State, thereby ensuring contextual relevance.

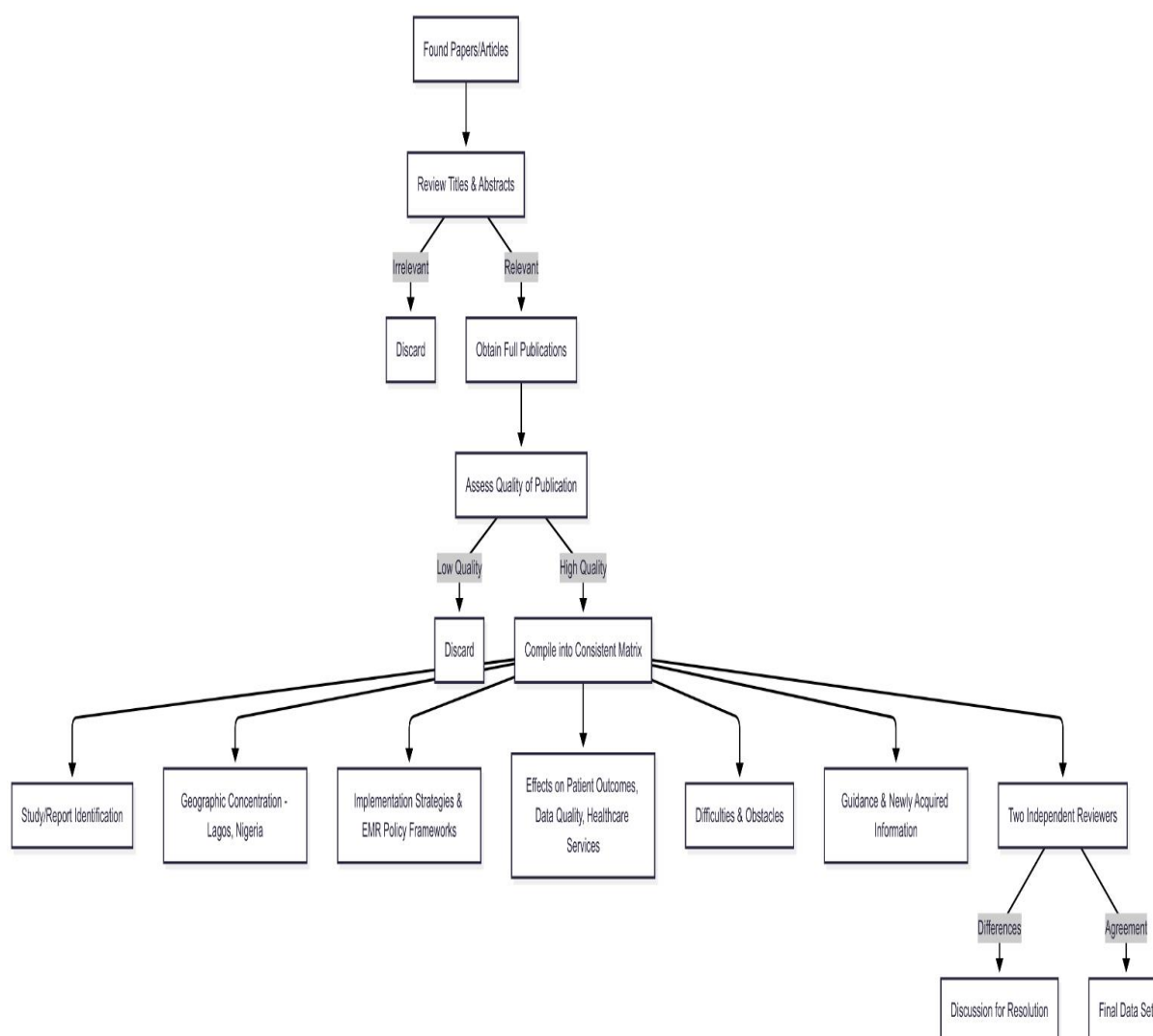
The timeframe restricts publications to a recent interval (January 2018 to April 2024), thereby reflecting the latest trends and policies in digital health. This is essential due to the swift advancement of technology and policy.

Document Type: Accepts various credible sources, including government documents, peer-reviewed articles, and international reports, recognising that significant information may not exclusively reside in traditional academic journals. The study design encompasses qualitative and quantitative methodologies, facilitating a thorough understanding of both the "what" and the "why/how" of EMR implementation.

Criteria for Exclusion: Irrelevance: Excludes studies that do not specifically address EMRs or those related to tertiary/primary care outside Lagos State, thereby preserving the established scope.

Absence of Empirical Evidence: Excludes solely theoretical policy analyses or opinion articles, thereby ensuring the review is based on substantiated data. The use of English is a practical necessity for the review team, imposing certain limitations.

Data Extraction and Management: This section outlines the systematic approach for managing the identified literature, guaranteeing consistency and precision. Figure: Process of Data Extraction



Code snippet Essential Components:

Two-stage screening involves an initial review of titles and abstracts, followed by a comprehensive assessment of full texts, serving as an effective method to eliminate irrelevant studies at an early stage. Quality assessment is essential for guaranteeing the reliability of evidence. The Consistent Matrix standardises data extraction points geographic focus, implementation, effects, challenges, and recommendations ensuring the collection of comparable information from all sources, thereby facilitating synthesis.

Independent Evaluators: An effective methodological approach to reduce bias and improve the precision of study selection and data extraction. Resolving discrepancies through discussion enhances reliability.

4. Synthesis

The thematic analysis method for synthesis is suitable for a systematic review of this type, facilitating the identification of patterns, gaps, and success factors across various sources. Thematic analysis involves identifying, analysing, and reporting patterns (themes) within

qualitative data. It is a method that provides a framework for understanding the data's underlying meanings and implications. This qualitative method identifies recurring themes, policy gaps, and success elements, offering a structured approach to analyse heterogeneous data. Triangulation involves utilising various sources, including peer-reviewed articles, policy documents, and grey literature, to validate findings, thereby strengthening the conclusions' validity and robustness.

Direct quotations and case studies: Incorporating these elements enhances richness and offers concrete examples, thereby grounding the findings in real-world experiences.

5. Constraints

Recognising limitations is essential in rigorous research and reflects critical self-awareness. Publication bias represents a prevalent limitation in systematic reviews, as studies yielding positive or significant results are more frequently published. Challenges in accessing internal reports can result in an incomplete understanding, particularly regarding implementation details and associated difficulties.

The dynamic nature of digital health results in findings becoming rapidly outdated. This underscores the significance of the limited date range for inclusion. The multi-source, methodical approach outlined is a notable strength that improves the validity and accuracy of the review.

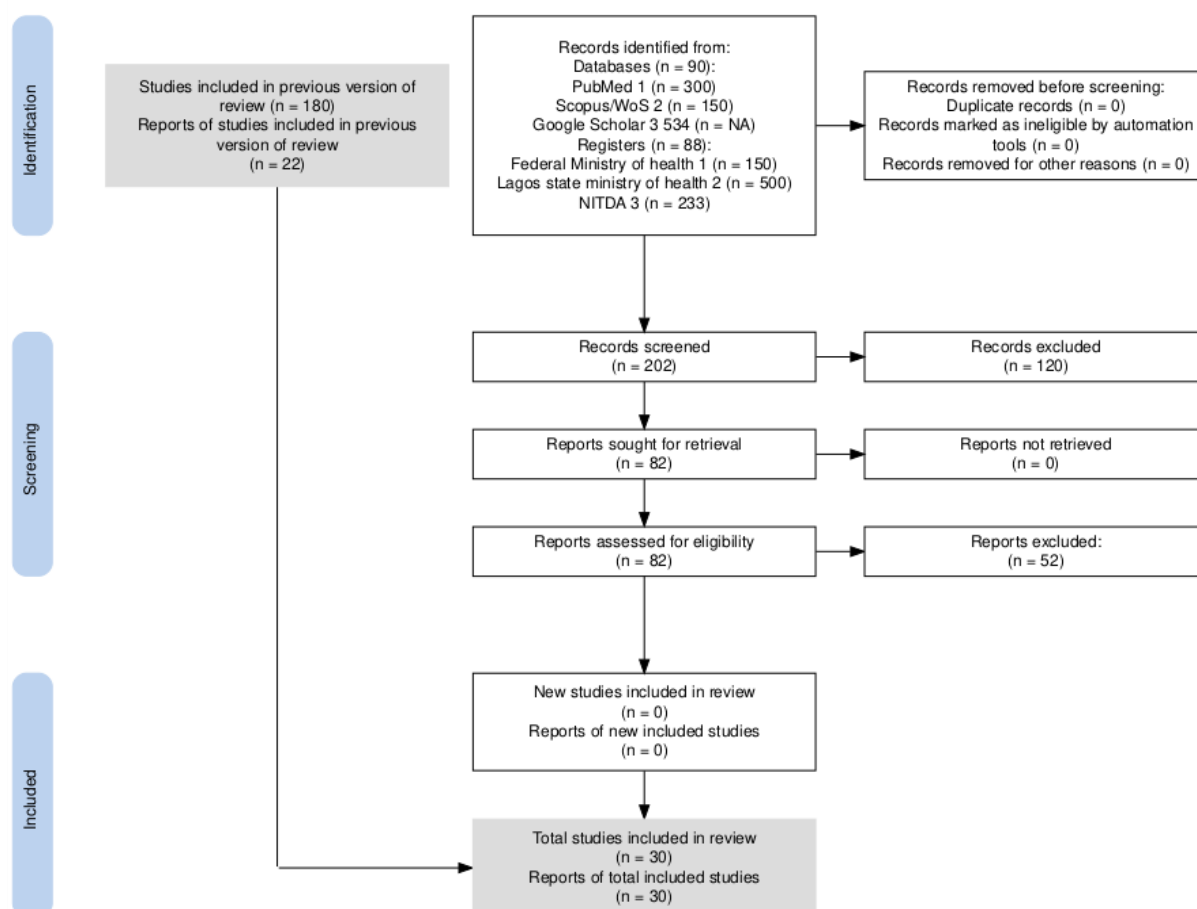
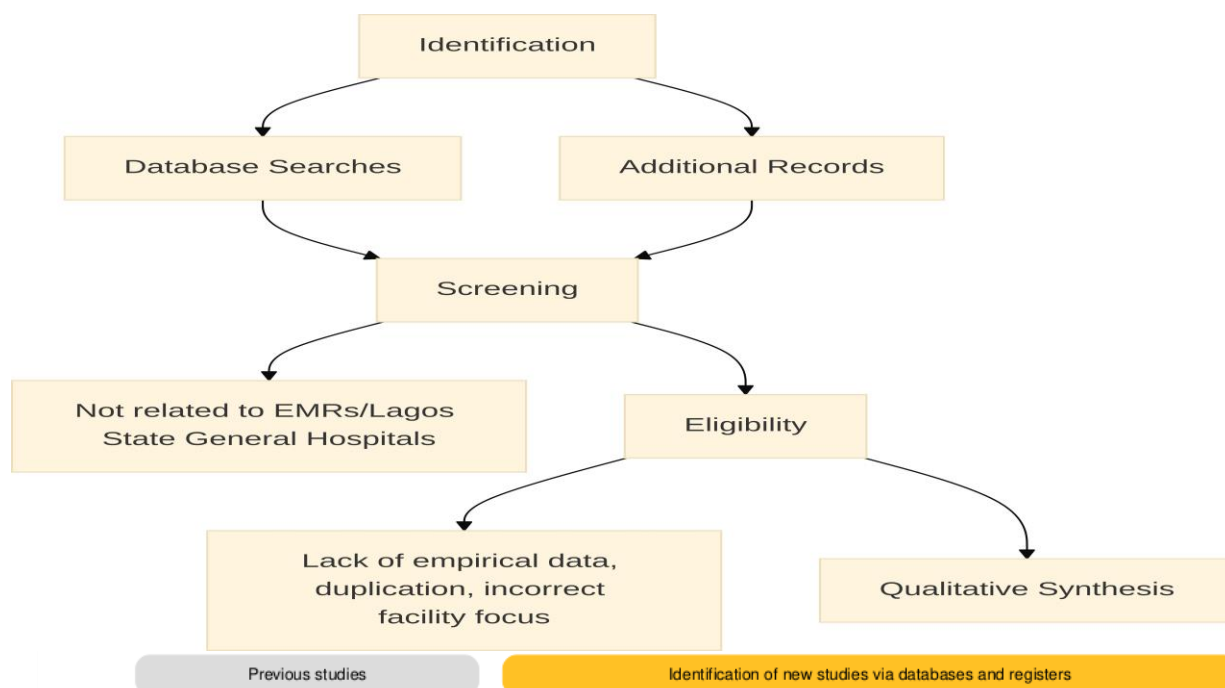
6. Key Study Summaries

Summaries of key studies offer essential context and illustrate the literature that will be examined in the comprehensive review. These examples demonstrate the significance of the selected sources and the insights they provide concerning challenges, policy advancements, and effects.

PRISMA Flow Diagram: Narrative Description

The narrative account of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow is exemplary. If a visual diagram is required in the document, it would resemble the following:

Figure: PRISMA Flow Diagram (Conceptual)



PRISMA Flow: Identification (n=202 total):

A total of 180 records were identified from PubMed, Scopus, Web of Science, and Google Scholar.

Supplementary Records: A total of 22 records were identified from grey literature and policy documents, essential for thorough coverage.

Screening (n=202 participants assessed): All identified records (202) underwent screening based on title and abstract. At this stage, 120 records were excluded due to their lack of relevance to EMRs or general hospitals in Lagos State, indicating effective initial filtering. Eligibility (n=82 evaluated for eligibility): Eight-two full-text articles were retrieved and evaluated according to the established inclusion and exclusion criteria. Fifty-two studies were excluded due to factors including insufficient empirical data, duplication, or misalignment with facility focus (primary/tertiary facilities outside Lagos).

Participants included in the study (n=30):

A total of 30 studies and reports were identified as eligible and incorporated into the qualitative synthesis. This constitutes the fundamental evidence base for the review. This PRISMA flow effectively illustrates the systematic process of study selection, a fundamental aspect of rigorous systematic reviews. The "Data Sources and Search Plans" section presents a systematic and well-justified methodology for conducting the review. Diverse sources, precise search terms, clear inclusion and exclusion criteria, and a structured data extraction process enhance the rigour and validity of the planned analysis. Recognising limitations enhances the review's credibility.

The important papers and sources included in the review are shown below:

1. Adeleke, I.T., Akinyemi, R.O., and Adekanye, A.O. (2021). The article titled "Implementation of Electronic Health Records in Nigeria: Possibilities and Difficulties\" was published in volume 50, issue 2, pages 72--80. Health Information Management Journal 10.1177/18333583 @ <https://d2>.
2. Ojo, A.I., Oni, O.O., and Ogunyemi, O.O. (2022). The article titled \"Adoption of e-health technologies in Nigeria: patterns and issues\" was published in volume 2211, pages 1-11. BMC Health Services Research 10.1186/s12913-022-07870-0 <https://doi.org/10.1186/s12913-022-07870-0>
3. Eze, I.C.; Ogundimu, K.; and Bamgboye, E.A. (2022). Nigerian digital health projects: an analysis of opportunities and development Reports on Global Health Journal, 6, e202200 10.29 392/001c.36333 <https://doi.org/10.29392/001c.36333>
4. The Ministry of Health in Lagos State published the 2023 DigitHealth Strategy Report. taken from <https://health.Lagosstate.gov.ng>
5. Ogunleye, O.O.; Basu, D.; Mueller, D.; and Sneddon. Yinka Seaton, R.A.Yinka ka-Ogunleye, A.F.; Wambua, S. The year 2022. Response to COVID-19: Nigerian electronic medical records' significance. Public Health Frontiers: 10, 859384. 10.3389/fpubh.2022.859384 @ [doi.org](https://doi.org/10.3389/fpubh.2022.859384). 7.
6. Ministry of Health, Federal Level. (2100). the 2021--2026 National Digital Health Policy Federal Ministry of Health: Abuja. The National Digital Health Policy PDF is available at <https://www.health.gov.ng>.
7. National Information Technology Development Agency (NITDA) published the 2019

Nigeria Data Protection Regulation (NDPR). The Nigeria Data Protection Regulation (NDPR) was published by NITDA in January 2019 in Abuja. <https://nitda.gov.ng/wp-content/uploads>

IMPLEMENTATION PROCESS IN GENERAL HOSPITALS

Electronic medical records (EMRs) have been implemented in general hospitals in Lagos State through a systematic, phased approach. This process is characterised by government policy, resource considerations, stakeholder engagement, and derived lessons. The following subsections provide a detailed, sequential account of the implementation process.

Strategic planning

The initial phase of execution commenced with strategic planning and a comprehensive needs analysis. The Lagos State Ministry of Health conducted baseline research to map existing ICT infrastructure, assess staff digital literacy, and evaluate workflow requirements, thereby determining the digital readiness of general hospitals (Lagos State Ministry of Health, 2023). This evaluation identified the facilities most suitable for the initial EMR implementation. This phase prominently featured stakeholder involvement. Consultative workshops comprised hospital officials, physicians, IT personnel, and patient advocates. The purpose of these meetings was to prioritise issues and promote end-user accountability. Initial involvement facilitated the identification of potential challenges and the customisation of the EMS system to align with local contexts, thereby improving staff acceptance and promoting effective implementation (Bamgboye et al., 2022).

Choosing a pilot site and customising systems

The assessment of their preparedness resulted in the designation of multiple general hospitals as pilot sites. The selection criteria included patient volume, level of management support, and existing ICT capability. Prior to broader implementation, these hospitals functioned as test sites for the deployment of electronic medical records (EMR), facilitating iterative learning. The selection of vendors was influenced by competitive factors; the Ministry of Health collaborated with private technology partners familiar with the Nigerian healthcare landscape. The clinical staff tailored the chosen EHR systems to conform to local documentation standards and care processes, ensuring alignment among data fields, templates, and workflows. The team evaluated interoperability with forthcoming national health information systems (Adeleke et al., 2021).

Development of Infrastructure

A significant initiative was undertaken to modernise hospital facilities. To ensure system dependability and minimise downtime, hardware such as desktop computers, servers, networking devices, and backup power solutions, including generators and inverters, was installed. Furthermore, as internet connectivity was prioritised, hospitals have acquired either new or enhanced broadband capabilities. Inconsistent electricity supply and fluctuating internet speeds continued to hinder the pace and consistency of EMR utilisation (Ogunyemi et al., 2022).

Capacity development and organisational change management

We established extensive capacity-building initiatives, recognising that human factors influence the acceptance of technology. Healthcare professionals, including doctors, nurses, records officials, and administrative staff, engaged in practical training courses. The subjects covered include patient registration, clinical documentation, safe data handling, and system troubleshooting.

Hospitals establish IT help desks to deliver real-time support, facilitating continuous learning and adaptation. Staff members designated as EMS "champions" were identified at each institution to guide colleagues, promote adoption, and relay feedback to the implementation team. This strategy facilitated peer learning, particularly among older or less technologically literate employees, and mitigated resistance to change (Adeleke et al., 2021).

Implementation of System and Data Transfer

The phased data migration enabled the shift from paper records to electronic records. Existing patient records were systematically digitised and incorporated into the EHR system. In the initial transition, the system was systematically lowered in parallel.

Upon the successful implementation of the system and the completion of initial data migration, "go-live" dates were established. During this period, implementation teams remained on-site to resolve technical issues and provide prompt support. The parallel operation of systems was concluded only after users demonstrated proficiency and the digital system exhibited reliability.

Assessment, Analysis, and Ongoing Enhancement

Routine monitoring and evaluation were integral to the process post-system launch. Performance indicators such as patient wait times, record retrieval speed, data entry accuracy, and system uptime were monitored and reported. Regular staff meetings and user satisfaction surveys provided an additional avenue for input.

The insights derived from pilot hospitals informed the incremental development of additional general hospitals in Lagos. User experience directly influenced modifications to infrastructure support, system features, and training programs. The Ministry of Health promotes knowledge exchange among hospitals, fostering a learning community regarding the adoption of digital health (Lagos State Ministry of Health, 2023).

Challenges and Determinants of Success

Despite meticulous planning and phased implementation, numerous issues remained unresolved. The use of EMR was occasionally hindered by infrastructure limitations, specifically concerning inconsistent power supply and internet connectivity. Concerns regarding heightened workload or potential data entry errors initially caused some staff members to be reluctant to abandon familiar paper-based systems. Funding limitations also affected the rate of scale-up in maintenance.

The successful implementation was facilitated by several factors, including robust policy support from the Ministry of Health, continuous stakeholder engagement, tailored training programs, and localised technical assistance. Hospitals that implemented E-learning initiatives and fostered a culture of adaptation and feedback demonstrated faster and more sustainable adoption processes.

Effects on Healthcare Service Delivery

The implementation of electronic medical records (EMRs) in general hospitals in Lagos State has significantly transformed healthcare service delivery. While change is ongoing and varies among facilities, numerous empirical studies, official reports, and user feedback indicate significant positive and negative impacts on clinical workflows, patient care, and health system performance. Enhanced operational efficiency is a well-documented benefit of adopting EMS. According to the Lagos State Ministry of Health (2023), digital registration and record-keeping have expedited the retrieval of medical histories and reduced patient wait times. Health professionals can now access patient records with minimal effort, eliminating delays and errors linked to the manual search of paper files. Effective EMS systems have decreased average record retrieval times in hospitals from hours to minutes, enabling physicians to concentrate more on patient care.

Improved Data Quality and Accessibility

EHRs have resulted in more accurate and comprehensive documentation of patient contacts. Mandatory fields facilitate the documentation of essential information during each visit (Ogunyemi et al., 2022), thus minimising omissions and inconsistencies. These advancements have enhanced the accuracy and quality of data available for health system planning, research, and clinical audits. Additionally, by facilitating evidence-based decision-making and public health surveillance, EMRs contribute to the aggregation and analysis of extensive datasets (Bamgboye et al., 2022). Enhanced coordination and continuity in digital records have facilitated improved treatment collaboration among hospital staff. Multiple healthcare professionals, including doctors, nurses, and chemists, can concurrently access and update patient records, thereby minimising communication gaps and reducing duplication of effort. Patient data can be securely transferred electronically, allowing EMSs to facilitate improved referrals between departments and across facilities (Lagos State Ministry of Health, 2023).

Patient safety and clinical outcomes

Studies on patient safety after the implementation of electronic medical records indicate positive trends. EHRs facilitate clinical decision-making by providing alerts for drug interactions, allergies, and abnormal laboratory results. These tools reduce the incidence of adverse events and prescription errors (Adeleke et al., 2021). Ogunleye et al. (2022) noted enhancements in patient management and outbreak response.

Enhancements in Administration and Reporting

E-medical records have streamlined billing, inventory management, reporting to health authorities, and overall administrative functions. Automated generation of statistical reports encompassing data on the utilisation of services and disease surveillance has reduced the administrative burden on staff while enhancing the timeliness and accuracy of submissions to the Ministry of Health (Lagos State Ministry of Health, 2023).

Ongoing Difficulties

Nonetheless, challenges persist despite these advancements. Variability in user adoption has been observed; certain health professionals, especially during initial implementation phases, express concerns regarding increased documentation time. Technical issues, including data synchronisation errors and system downtime, can disrupt processes. Several facilities continue to experience challenges in EMR utilisation due to infrastructural deficiencies, particularly inconsistent power supply and internet connectivity (Ogunyemi et al., 2022). Current priorities include data privacy and patient trust, necessitating continuous staff training and robust IT security measures.

Considerations of Equity and Access

E-learning has improved treatment quality in fully utilised hospitals; however, disparities persist between urban and rural facilities. The adoption of EMS has allowed hospitals with superior funding, infrastructure, and management support to achieve greater benefits, underscoring the necessity for targeted investment and assistance for underperforming facilities (Bamgboye et al., 2022).

Challenges and Barriers

Lagos State general hospitals have experienced advantages from electronic medical records (EMRs); however, the implementation process has encountered numerous challenges. The obstacles encompassing technical, organisational, financial, and sociopolitical dimensions influence the rate of adoption and the sustainability of EMR systems.

Challenges Related to Technical and Infrastructure Aspects

The deficiency and inconsistency of supporting infrastructure present a significant barrier to the implementation of EMS in general hospitals in Lagos State. Numerous facilities encounter frequent power outages and unreliable internet connectivity, hindering access to electronic systems and obstructing real-time data entry (Mi et al., 2022). Recurring issues frequently compel hospitals to revert to paper-based procedures during downtimes, thereby undermining the consistency and continuity of digital records. Furthermore, the restricted availability of hardware, including computers, servers, and networking equipment, results in traffic congestion for both administrative and clinical users. Occasionally, older computers and insufficient backup power sources lead to hardware failures, data loss, and system lags (Adeleke et al., 2021).

Human Resource and Change Management Challenges

A notable barrier is the resistance to change exhibited by medical professionals. Certain employees, particularly those with limited technological proficiency, express apprehensions regarding the transition from paper-based to electronic systems. Concerns include increased workload, reduced autonomy, and anxiety regarding errors in a new system (Bamgboye et al., 2022). The issues are further complicated by inadequate or inconsistent training programs, as not all users receive uniform support or ongoing refresher courses. High staff turnover and redeployment adversely affect the sustainability of electronic medical records (EMR). Ongoing investment in training and orientation is essential to maintain system usage and troubleshooting capabilities following the departure of trained staff members.

Sustainability and Financial Constraints

The limitations of funding continue to pose a significant challenge. While initial pilot projects in Lagos received government support and donor funding, expanding electronic medical records (EMRs) to all general hospitals necessitates substantial ongoing investment. The expenses encompass hardware acquisition and upkeep, software licenses, network infrastructure, and continuous training (Adeleke et al., 2021). Digital health projects may experience diminished focus amid budget reductions or shifting political priorities, potentially resulting in interruptions or stagnation in their development.

Concerns regarding data quality, privacy, and security

Ensuring data integrity and quality presents a persistent challenge, especially during the initial stages of EHR adoption. Inconsistent data from legacy records and intermittent system faults can undermine the accuracy and reliability of patient information (Ogunyemi et al., 2022). Maintaining robust data privacy and security is essential. Compliance with the Nigeria Data Protection Regulation (NDPR) is essential; however, deficiencies in password management, unauthorised access, or insufficient encryption may lead to system vulnerabilities.

Challenges in Interoperability and Integration

The restricted interoperability of electronic medical records with other digital health systems and national health information systems presents an additional challenge. Many contemporary EHR systems operate as independent entities, complicating data sharing among departments or facilities and hindering integration with laboratory, pharmacy, or public health reporting systems.

The fragmentation of EMRs restricts their effectiveness in comprehensive health system planning and hinders the attainment of integrated, patient-centered care (Bamgboye et al., 2022).

Socio-cultural and organisational barriers socio-cultural factors, including scepticism towards new technology and concerns regarding job displacement, can affect user engagement and system acceptance. In certain hospitals, organisational culture may resist process change, particularly when leadership lacks full commitment to digital transformation.

Challenges in Policy and Regulations

Lagos State has established a supportive policy framework; however, the standards and accountability systems remain inadequate. Periodic policy updates and clearer guidelines on the use of EMS, particularly concerning data sharing and patient consent, are necessary to address evolving issues and user concerns (Lagos State Ministry of Health, 2023).

Recommendations and Future Directions

Various recommendations and strategic approaches are proposed to enhance the adoption of electronic medical records (EMR) and to conduct an empirical review of EMR policy implementation in general hospitals in Lagos State.

Enhance Infrastructure and Technical Assistance

Ongoing investments in reliable power sources, robust internet connectivity, and contemporary hardware are essential. Hospitals should evaluate alternative power sources, such as solar energy, and prioritise supplementary systems to minimise downtime. IT support teams established at the facility level can deliver timely troubleshooting and ongoing technical support (Adeleke et al., 2021).

Enhance and maintain capacity-building efforts.

Institutions ought to implement a systematic and ongoing training program encompassing advanced data security, data analytics, and change management, alongside essential EMR competencies. New and existing employees ought to undergo training via refresher courses and mentoring programs (Ogunyemi et al., 2022). Recognising and rewarding e-learning "champions" can enhance adoption rates and boost morale further.

Improve data quality, privacy, and security.

Hospitals must implement standardised data entry, validation procedures, and conduct regular audits to maintain data integrity. Hospitals are required to comply with the Nigeria Data Protection Regulation (NDPR) and to implement robust security measures, such as two-factor authentication and routine password updates. Conducting cybersecurity drills and performing regular data quality audits are essential for sustaining compliance and fostering trust.

Promote interoperability and integration.

Establishing and implementing national data standards, such as HL7 and FHIR, will enhance interoperability among electronic health records (EHRs) and various healthcare information systems, including public health surveillance platforms, laboratories, and pharmacies. The Lagos State Ministry of Health should promote integration initiatives with national health information exchanges to facilitate seamless data sharing and ensure continuity of care (Bamgboye et al., 2022).

Establishing reliable and enduring financial support

The government must establish consistent budget allocations for digital health infrastructure and maintenance to reduce dependence on donor funding. Exploring innovative funding mechanisms, such as public-private partnerships, health ICT taxation, or digital health bonds, will facilitate the acquisition of supplementary resources for the maintenance and expansion of EHR systems.

Enhance policy frameworks, governance structures, and accountability mechanisms. Digital health policies require regular review and updates to align with emerging technologies and evolving challenges. Establishing clear responsibility systems, which incorporate feedback loops, evaluations, and regular monitoring, will ensure compliance and facilitate continuous development. The incorporation of patient representatives, healthcare professionals, and private sector partners, among other stakeholders, into governance systems is expected to influence the Lagos State Ministry of Health (2023).

Advance Equity and Foster Inclusive Access

Assistance should be directed towards underfunded and rural hospitals to guarantee equitable benefits from EMS investments across all facilities. Policies must address language restrictions and digital literacy gaps to facilitate inclusive access for both patients and medical professionals.

Promote research and innovation

Ongoing studies on the impact, cost-effectiveness, and user experience of EMR will provide essential local evidence to inform implementation strategies. Pilot initiatives examining development. The Ministry of Health should support technologies such as telemedicine modules, artificial intelligence for clinical decision support, and mobile health integration.

Prospective Pathways

Future advancements in health informatics, evolving policy frameworks, and insights gained from ongoing implementation will shape the digital transformation of Lagos State. Significant future developments encompass the expansion of e-learning initiatives targeting private hospitals and primary healthcare facilities.

- Integration of disease surveillance systems and national health insurance with electronic medical records (EMRs)
 - Adoption of scalable, cloud-based EMR solutions with disaster recovery capabilities
 - Increased involvement of end users in system design and customisation.
- Lagos State has the potential to lead in digital health, improve patient outcomes, and serve as a model for other states and countries addressing similar challenges and implementing these recommendations.

Conclusion

The digital transformation of healthcare in Nigeria. This empirical analysis indicates a trajectory marked by both successes and persistent challenges, yet it reflects promise and progress.

EHRs have enhanced healthcare service delivery by improving operational efficiency, data quality, clinical decision-making, and administrative procedures. The proactive policy framework, phased rollout strategy, and focus on capacity building by the Lagos State government have effectively facilitated successful implementation. The experiences of general hospitals in Lagos offer valuable insights for other states and health systems embarking on similar digital health initiatives.

The review highlights ongoing obstacles, including issues related to data interoperability and security, funding limitations, infrastructure deficiencies, and challenges in human resources. The challenges highlight the necessity for sustained investment, continuous staff development, robust governance, and adaptable policy formulation. The future sustainability and scalability of EMR systems in Lagos State will be influenced by effective government leadership, collaborative partnerships across sectors, and the implementation of inclusive, patient-centered innovations. Lagos State can enhance its leadership in digital health by addressing existing gaps and leveraging acquired knowledge, thereby improving health outcomes and promoting greater equity in healthcare access. In the context of Lagos and Nigeria's evolving health information technology landscape, ongoing research, stakeholder engagement, and policy enhancement are essential. The effective institutionalisation of EMRs positions the healthcare system to address both present and future public health challenges, fostering resilience, efficiency, and responsiveness.

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