

## Benefits of integrated electronic medical record in the efficiency of health services

Beneficios de la historia clínica electrónica integrada en la eficiencia de los servicios de salud

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### ABSTRACT

**Introduction:** The Integrated Electronic Medical Record (IEMR) is a tool that centralizes patient medical information, improving efficiency in healthcare services. Its implementation optimizes data access, reduces costs, and enhances patient care. **Objective:** To identify the use and benefits of the IEMR in the efficiency of the healthcare system, evaluating its impact on clinical management, resource optimization, and patient safety. **Methodology:** A systematic review with a descriptive approach was conducted using databases such as PubMed, Scopus, and LILACS. Articles were selected based on specific inclusion criteria, and the PRISMA methodology was used for data collection. **Results:** The implementation of the IEMR improves the quality of care, reduces administrative times, and facilitates medical decision-making. It also enables better coordination among healthcare professionals, minimizing errors and promoting continuity of care. **Conclusions:** The IEMR is a key strategy for modernizing the healthcare system, favoring the integration of information between public and private sectors. Its implementation requires investment in technological infrastructure, staff training, and regulations to ensure data security.

**Keywords:** Electronic Medical Record, Healthcare Efficiency, Health Digitalization, Hospital Management, Health Technology.

### RESUMEN

**Introducción:** La Historia Clínica Electrónica Integrada (HCEI) es una herramienta que centraliza la información médica de los pacientes, mejorando la eficiencia en los servicios de salud. Su implementación permite optimizar el acceso a datos, reducir costos y mejorar la atención. **Objetivo:** Identificar el uso y beneficios de la HCEI en la eficiencia del sistema de salud, evaluando su impacto en la gestión clínica, la optimización de recursos y la seguridad del paciente. **Metodología:** Se realizó una revisión sistemática con enfoque descriptivo utilizando bases de datos como PubMed, Scopus y LILACS. Se seleccionaron artículos bajo criterios de inclusión específicos y se empleó la metodología PRISMA para la recopilación de información. **Resultados:** La implementación de la HCEI mejora la calidad asistencial, reduce tiempos administrativos y facilita la toma de decisiones médicas. También permite una mejor coordinación entre profesionales de salud, minimizando errores y promoviendo la continuidad de la atención. **Conclusiones:** La HCEI es una estrategia clave para la modernización del sistema de salud, favoreciendo la integración de información entre sectores público y privado. Su implementación requiere inversión en infraestructura tecnológica, capacitación del personal y regulaciones que garanticen la seguridad de los datos.

**Palabras clave:** Historia Clínica Electrónica, Eficiencia en Salud, Digitalización Sanitaria, Gestión Hospitalaria, Tecnología en Salud.

## INTRODUCTION

A patient's medical record is a legal medical instrument that compiles data regarding health and various services that have been used for a particular patient, to facilitate optimal health care. This document is tangibly seized in folders that are managed at the hospitals and that have been used since ancient times. These medical records constitute a large repository at the hospital level.

According to the Pan American Health Organization (PAHO), 2021, with the documentation obtained in the medical records, data is generated to later be used in various functions that benefit the patient and the statistics area. For this reason, as time goes by, this documentation is grouped into databases that, together with the use of operating systems (Software) and Information and Communication Technologies (ICT), speed up the obtaining of medical information, thus reducing costs in the budget and optimizing resources (Fernández et al. 2013).

The Spanish medical record is governed by the Official State Gazette 2023 and Law 41/202 issued in November, which establishes patient autonomy, rights, obligations regarding information and clinical documentation stipulated in Article 3 of Chapter I, referring to the fact that the medical record is a collection of records containing information, assessments and information on the patient's clinical situation and evolution generated during their care (BOE, 2002).

On the other hand, in France the Government has stipulated several objectives within the health sector, among them the main one is to promote online access for each patient to all their medical data and thus simplify the exchange of information between all health professionals through a Shared Medical Record (Dossier Médical). Shared). Where it is the patient who authorizes the manipulation of the DMP, that is, the patient has control of access to the service at all times, which is highly secure (Nicolau, 2022).

You can add information (emergency contact person, trusted person, end-of-life will, etc.) or decide to hide certain documents, and you can receive an email notification every time a new document is added or authorization is requested to verify your data (Fernandez, 2013).

The information collected between doctor and patient must be projected towards a broader horizon, where in addition to the health-disease area, there is an interrelation with the emotional and socio-environmental context of the patient, with the inclusion of relevant aspects such as personal pathological history, results of examinations and radiodiagnostic images, surgical records, etc. (OPS, 2021).

They must be managed in a timely manner and at the same time, easy to review anywhere where a computer and internet are available, all this to carry out an adequate follow-up of the patient regardless of the medical center where he or she was treated (BOE, 2002).

Consequently, there are governmental and non-governmental organizations that promote the emergence of a digital clinical history, for example, in the case of Uruguay, within the health sector. One objective was the creation of the Integrated Electronic Medical Record at a national level with the consequent slogan of allowing institutions to correct each of the user care processes, favor safer and more comprehensive patient care and, therefore, facilitate the continuity of the care process; however, this guideline excludes the private sector (BOE, 2002).

On the other hand, in Honduras, an electronic medical record (EMR) was projected at the level of a state hospital, the premise of which is the search for clinical data that are currently recorded in tangible files, to be replaced by electronic documents and information; similarly, this project exclusively contemplated the public sector (Brecha Cero, 2018).

In Chile, the creation of an Electronic Medical Record model, as a principle of reducing paper usage, seeks to reduce the high costs generated by these services, while facilitating the inspection and control of so-called medical licenses in the country. However, it once again faces a limitation, as it is only carried out at the public sector level (PAHO, 2024).

In Ecuador, the integrated healthcare network is established with its different entities, such as the Ecuadorian Social Security Institute (IESS), the Ministry of Public Health (MSP), the National Police Social Security Institute (ISPOL), and the Armed Forces Social Security Institute (ISFA), where each entity has a unique and non-transferable data storage system that is not shared among them.

On the other hand, the search should be extended until a model is found that groups the data generated within care at both the public and private levels. Currently, in the research conducted in Spanish, there is no data from records where a unified medical history is disclosed that compiles public and private information from a territory (Gonzalez, 2020).

Therefore, the objective of this work is to identify the use and benefits of a Unified Electronic Medical Record in the National Health System that can be viewed in public and private entities with prior patient authorization, respecting their autonomy and considering the ethical aspects of beneficence and non-maleficence for proper information management.

This will eliminate geographical barriers and unnecessary waiting times, promoting the referral and counter-referral system, managing both time optimization and state resources with a significant impact for the benefit of the patient, with the ease of having the required information at hand.

## METHODOLOGY

This research is a systematic review with a descriptive scope, which aims to systematically summarize the information found in different databases regarding the research topic (Serrano et al., 2024), this answers a research question:

P (Population): Health institutions and health professionals that use integrated electronic medical records.

I (Intervention): Implementation of integrated electronic medical records.

C (Comparison): Use of paper medical records or non-integrated systems.

O (Outcome): Improvement in the efficiency of health services (time reduction, resource optimization, improvement in care).

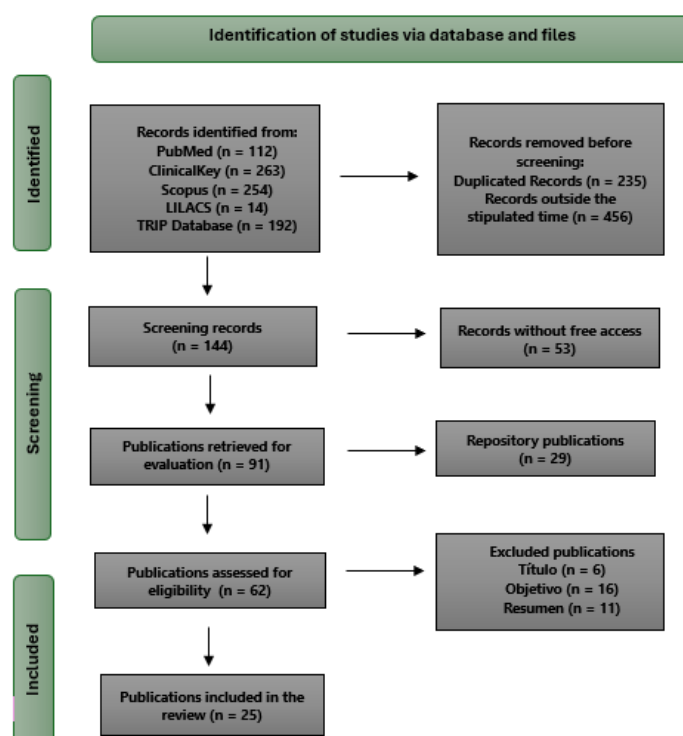
### PICO Question

In health institutions, does the implementation of integrated electronic medical records, compared to the use of paper medical records or non-integrated systems, improve the efficiency of health services?

The population of this study is made up of 835 articles available in different databases such as: PubMed, Scopus, ClinicalKey, LILACS and TRIP Database; to carry out the literature search, Health Sciences/Medical Subject Descriptors were used. Headings (DeCS / MeSH) such as: Electronic Medical Record, Health Efficiency, Health Digitalization, Hospital Management, Health Technology, these terms were operated through the use of the boolean OR and AND.

The sample of this research was selected using the following inclusion criteria: original scientific articles, systematic reviews and case studies published since 2019, open access publications, articles without language restrictions were also included. On the other hand, repository articles, unverified grey literature and duplicate works were excluded. The application of these criteria during the selection of studies was evidenced by using the PRISMA 2020 methodology flowchart (Preferred Reporting Items for Systematic reviews and Meta- Analyses) for conducting systematic reviews. This selection is reflected in the PRISMA flowchart in Figure 1.

**Figure 1.** Flowchart for item selection



Fountain: PRISMA Declaration, 2020.

## RESULTS AND DISCUSSION

Table 1. Classification by author, year, title, type of study and findings

Authors	Year	Qualification	Type of Study	Findings
5G Americas	2019	ICT for Development Study Series: Electronic Medical Records in Latin America	Technical report	Analysis of the adoption of Electronic Medical Records (EMR) in Latin America and its impact on health systems.
Albarracín, R.	2018	Results of the implementation of electronic medical records (EMR) at the regional level	Case study	Evaluating the results of EMR implementation in different regions, highlighting improvements in efficiency.
Añel, R., García, I., Bravo, R., & Carballeira, J.	2021	Electronic medical records and prescriptions: risks and benefits detected since their implementation	Case study	Identification of the risks and benefits associated with the implementation of EMRs and electronic prescriptions.
Barreiro, S.	2024	Health Cost Management	Case study	Analysis of how health costs can be efficiently managed using tools and technologies.
Berastain Merino, HH, Pérez Valles, CE, & Medina Sotelo, CG	2022	Single universal digital medical record in Peru: from chaos to order in medical information	Descriptive study	Evaluation of EMR implementation in Peru, showing progress towards standardization and organization of information.
Bravo, M.	2023	Implementation of a clinical history module to improve care at the Ramos Larrea Maternal and Child Center - Cañete; 2020	Implementation study	Results of the implementation of a medical history module, improving the quality of hospital care.
Zero Gap	2018	Honduras advances in the implementation of electronic medical records	Status report	Report on progress and challenges in the implementation of EMR in Honduras, highlighting the importance of digitalization.
Cha, M.	2020	Electronic medical records: factors that push physicians to use them	Qualitative study	Identification of barriers to EMR adoption by physicians, including cultural and technological resistance factors.
Deloitte Threat Intelligence & Analytics	2021	The evolution of cybersecurity in the health sector	Technical report	Study on the evolution of cyber threats in the health sector and the security measures adopted.
Fernandez, J.L.	2013	Security and privacy in electronic health records: A systematic literature review	Systematic review	Literature review on EMR security and privacy, highlighting concerns and technological solutions.
Fernandez, A., Agostinelli, M., Arias, M., Urrutia, M., & Maestri, W.	2021	The experience of implementing an electronic medical record in seven centers in less than a year	Case study	Account of the experience of implementing EMRs in seven centers, highlighting challenges and lessons learned.
Font, M., García, M., Fernández, T., & Carralero, A.	2021	Quality of hospital admission management in internal medicine services	Quality study	Evaluation of the quality of hospital admission management, highlighting the improvement in process efficiency.
García, M., Rodríguez, I., & Cabrera, C.	2022	Digital medical records. Application of information and communication technologies in clinical management and appointment processes	Study on technological applications	Analysis of the implementation of EMR in clinical management, highlighting improvements in appointment and care processes.
Gomez, V.	2022	Implementation of electronic medical record integration with diagnostic support systems using middleware	Technical study	Evaluating the integration of EMR with diagnostic systems, improving the efficiency of the outpatient consultation process.
Gonzalez, J.	2019	Scientific production on digital clinical history: an analysis from Scopus	Literature review	Analysis of scientific production in Latin America on EMR, identifying trends and areas of development.
Haleem, A., Javaid, M., Pratap, R., Suman, R., & Rab, S.	2021	Blockchain technology applications in healthcare: An Overview	Technical review	Study on the application of blockchain technology in healthcare, with an emphasis on improving data security.
Indteca	2022	View of the unique universal digital medical record in Peru: from chaos to order in medical information	Review article	Analysis of the transition towards universal EMR in Peru, highlighting the improvement in access and management of information.
Lasso, J., Lasso, M., Fernandez, A., Agostinelli, M., Arias, M., Urrutia, M., Maestri, W.	2021	The experience of implementing an electronic medical record in seven centers in less than a year	Case study	Report on successful EMR implementation in seven centers, with emphasis on operational and technological challenges.
Palacios, M.	2019	The quality of research with real- world evidence	Case study	Evaluation of the quality of evidence-based research in the health sector, with implications for the EMR.
Paladines, V., Monge, F., Monge, F., Jumbo, J.	2020	Medical diagnosis and patient care	Study on diagnosis and care	Evaluation of medical diagnosis and improvement in patient care through the implementation of EMR.
Perez, T., Gomez, L., Alvarez, S., Cabello, L., & Mombiela, M.	2017	Electronic medical records: evolution of the doctor-patient relationship in primary care consultations	Case study	Study on how the EMR has transformed the doctor-patient relationship in primary care, highlighting improvements in efficiency.
Rojas, G.	2021	The medical record: A look from bioethics	Ethical study	Reflection on ethical aspects related to the implementation of EMR in the context of medical bioethics.
Schreiber, R., & Garber, L.	2020	Data migration: A thorny issue in electronic health record transitions—case studies and review of the literature	Transition study	Analysis of data migration challenges during the transition to EMR, with case study examples.
Tsai, C., Eghdam, A., Davoody, N., Wright, G., Flowerday, S., & Koch, S.	2020	Effects of Electronic Medical Record Implementation and Barriers to Adoption and Use: A Scoping Review and Qualitative Analysis of the Content	Qualitative review	Review of the effects of EMR implementation and barriers to adoption, highlighting cultural and technological factors.
Vargas, V., & Hernandez, C.	2019	Medical record: its potential in hospital cost management	Cost study	Study on how digital medical records can optimize cost management in hospitals.

Source: the authors.

### Integrated Electronic Medical Record (IEMR)

It is a health information system that allows centralizing and unifying a patient's clinical information in a single repository that is accessible to health professionals at the public and private levels regardless of where care is provided (Tsai et al. 2020).

Following the implementation of the electronic medical record (EMR), the registration of patient data was unified, improving the quality of the record, the efficiency of administration and supporting health personnel to achieve better quality, safety and coordination in care (Tsai et al. 2020).

Likewise, the implementation of the IEMR creates the opportunity to promote a new culture of care, increasing responsibility and transparency in the service, improving communication and interprofessional practices, facilitating transfers to different care homes according to the diagnosis and needs of the patients at the same time it would allow creating the capacity to collect more precise data supporting decision-making (Fernández et al. 2021).

The components of the Electronic Medical Record are important since in this way the medical staff can provide different uses to each of the IEMR, since it collects and stores information such as Electronic Medical Records from different health institutions, results of laboratory and imaging tests, medication prescriptions, vaccination records, specialist reports (5G Americas, 2019).

### **Evolution of clinical history and its application in daily clinical practice**

The medical record has evolved significantly over time, from its beginnings as simple records of observations written on paper and compiled in folders that were used only when the patient used a hospital entity and then were archived, to its current electronic form (Rojas, 2021).

The evolution of the clinical history refers to the process of monitoring and updating information through a clinical diagnosis that requires 2 aspects of logic: analysis and synthesis, using certain tools such as anamnesis, clinical history, physical examination, complementary examinations and treatment, these data are generated during medical care providing the physician with a complete and updated view of the patient's condition, allowing them to make informed decisions and provide personalized and effective medical care (Paladines et al., 2020).

The use of clay tablets, papyrus and parchment was a common practice in Greece, Egypt and Mesopotamia to record symptoms, diagnoses and treatments of patients. During the Middle Ages, medical records were mainly stored in monasteries and religious hospitals to safeguard the information and avoid legal problems (Rojas, 2021).

In the 19th century, clinical record began to acquire a more scientific character, new formats were introduced and the information to be recorded was standardized. During the 20th century, the introduction of the electronic medical record (EMR) was evident, allowing better storage, access and analysis of clinical information (Pérez et al. 2017).

Nowadays, the EMR has become the standard form of recording clinical history where new technologies, such as artificial intelligence, are used; they are beginning to transform the way clinical information is used (Pérez et al. 2017).

The electronic medical record (EMR) together with emerging technologies guarantee a future where medical care will be more precise, efficient and patient-oriented. At present, the implementation of this process presents several fronts of resistance such as interference in the doctor-patient-bureaucracy relationship, the time factor related to the limited use of technology associated with fear of the unknown, distrust of the computer tool, inadequacy of the work system of medical professionals and interests of medical professionals, lack of altruism on the part of corporations (Chá, 2020).

The incorporation of ICTs during medical care has become a great challenge today, which involves overcoming barriers to its application (Chá, 2020). These technologies have made it possible to implement specialty teleconsultations in a managed manner that is easily accessible from any device that has Internet access. In social-health centers, direct communication platforms with Primary Care are necessary to improve the care received by users of these centers and, ultimately, their quality of life (García et al. 2022).

### **Benefits of the Integrated Electronic Medical Record**

Research points to multiple benefits for patients, healthcare professionals and the healthcare system in general.

#### *Institutional level*

1. Health alarm systems are improved.
2. Reduction in the file.
3. Quick accessibility.
4. Control over the use of medication.
5. Case investigation.
6. Feasibility for resumption or continuity of treatments (Berastain et al., 2022).
7. Ease of readability, security and organization in the management of medical information (Berastain et al., 2022).
8. Managing confidentiality.
9. Univocity in the entry of medical data considering one history-one patient (Notimerica, 2023).

### *Patients*

1. Improve the quality of care by having access to a complete and accurate medical history, facilitating clinical decision-making for health professionals.
2. Reduce medical errors resulting from lack of communication and fragmentation of information (Palacios, 2019).
3. Increase the efficiency of care by helping to reduce the time patients spend on administrative procedures and waiting in lines.
4. Improves patient satisfaction by providing easier and more comprehensive access to their medical information (Indteca, 2022).

### *Health professionals*

1. Improves communication and collaboration between healthcare professionals caring for the same patient (Palacios, 2019).
2. Access to real-time information from anywhere.
3. It improves the coordination of clinical care, improving the availability and timeliness of medical information at the outpatient and inpatient levels, reducing the administrative burden on health personnel (Lasso et al., 2021).
4. It allows for adequate support, which results in increased user satisfaction.

### *Healthcare system*

1. It reduces administrative and operational inconveniences (Lasso et al., 2021).
2. Reduce costs by avoiding duplication of tests and procedures, improving the efficiency of care.
3. Improves public health by facilitating disease surveillance and outbreak identification (Huarac, 2021).

## **Implications of patient data management in clinical practice**

Effective management of patient data in clinical practice is a fundamental component of modern clinical practice. It refers to the process of collecting, storing, organizing and using information related to the medical care of each age group served in a health entity (Font et al. 2021).

This includes demographics, medical history, symptoms, allergies, test results, treatments, prescribed medications, and any other information relevant to a particular patient's healthcare. It is therefore crucial to ensure safe, more accurate, personalized, coordinated, and quality healthcare. By accessing and analyzing this data, physicians can make more informed clinical decisions and offer more individualized treatment (Font et al. 2021).

According to the Pan American Health Organization (2021), health information systems focus on the development of software, isolated electronic health records or vital statistics, which must be considered as an integrated mechanism of interoperable and interconnected systems and processes that ensure the convergence of data, information, knowledge, standards, people and institutions.

According to the Pan American Health Organization (2021), it considers relevant aspects such as improving efficiency and productivity, since efficient data management can help reduce the time spent on administrative tasks, such as searching for medical records or scheduling appointments. This optimizes patient care time as the doctor focuses on meeting the user's needs.

Analyzing another study published in the Ingenio magazine of the Central University of Ecuador, it is noted that in the country the implementation of electronic medical records is scarcely applied in public or private institutions due to the complexity and high cost of its development and maintenance with the companies that develop clinical software, but the benefits of electronic medical records versus paper medical records should be taken into consideration, such as access, availability of information, readability, security and integration with other components of the information system. The author emphasizes the importance of establishing regulations and standards at a national level to achieve interoperability of computer systems related to the health system (Albarracín, 2018).

Cybersecurity involves advances and risks related to the future of health since it is considered one of the most active productive areas where several patients come daily to receive care in different health institutions. Therefore, the field of

cybersecurity encompasses the management and coordination of corporate cybersecurity policies, disaster management and recovery, privacy and confidentiality of information, legislative changes, security architecture, proactive pentesting actions, security audits and active detection of intruders by clinical teams and technical areas (Deloitte Threat Intelligence & Analytics, 2021).

Within what constitutes an Electronic Medical Record network architecture, the national database or repository is described at the top, with a sub-level where the information can be managed and distributed institutionally and, with the relevant authorization, can be viewed or consulted in different health areas.

### **Information in Health Management Systems**

The application of technology in the field of medicine has revolutionized the way diseases are diagnosed, treated and managed. The health system must employ the use of new information and communication technologies (ICT), therefore, the establishment of these denotes a marked advance in health care and together they promote better performance in the safety of medical care (Añel et al. 2021).

Some examples of technologies or technological tools in the medical-health field include: telemedicine, which although it is true that it was already working to some extent, its use was predominant during the COVID-19 pandemic (Añel et al. 2021).

Thus, telemedicine allows remote medical consultation through videoconferencing; another technology is artificial intelligence, which provides support in the diagnosis of diseases and in the interpretation of radiodiagnostic images; virtual reality, which is used in rehabilitation and medical training; wearable devices, which constantly monitor the health of patients. These technologies are improving the efficiency, precision and accessibility of medical care while providing more personalized care, optimizing resources in a health environment (Añel et al. 2021).

Based on the above, health management systems can be defined as technological tools or platforms to efficiently and effectively manage resources, operations and services in the health field, also managing information related to patients, such as medical records, medical appointments, test results, among other relevant data. These systems are essential to improve efficiency in medical care and ensure proper monitoring of people's health (Gonzalez, 2019).

In the field of health technologies, an article published in the International Journal of Intelligent Networks defends "Blockchain", which is a registration technology that provides a secure, transparent database and, when applied to health services, implements solutions based on this system to improve its processes, creating innovative solutions in various sectors, including the health sector (Haleem, et al. 2021).

The use of blockchain enables the storage and sharing of patient data with hospitals, diagnostic laboratories, pharmaceutical companies, physicians, and other entities, and this application can quickly identify major errors that could pose a risk to the medical field. Therefore, it can improve the efficiency, security, and credibility of medical data sharing, which can be advantageous for medical institutions. (Haleem, et al. 2021).

### **Costs and Expenses Associated with the Integrated Medical Record**

Managing expenses and costs associated with the unified medical record involves managing the financial resources required to maintain and update patient information in a unified medical record system, which entails significant expenses in implementation, maintenance and data security to ensure the sustainability of the IEMR in healthcare entities (Bravo, 2023).

The Integrated Electronic Medical Record has the great potential to generate savings in different areas for both the patient and the hospital entity, which includes several aspects, such as the reduction of duplication of tests, examinations and procedures, since the IEMR allows health professionals to access all of the patient's medical information from a single repository (OPS, 2021).

On the other hand, it promotes an improvement in administrative efficiency, since the IEMR can help streamline administrative processes, such as scheduling appointments, performing relevant laboratory and imaging tests, referring cases to other health entities, and billing in the case of private entities. The key benefit is to improve care by providing health professionals with complete access to the patient's medical history, allowing them to make better clinical decisions, while improving patient satisfaction regarding the quality of care they receive if they have access to their IEMR and can share it with their healthcare providers (Bravo, 2023).

Managing the costs and expenses associated with the IEMR also presents some challenges including implementation costs, and ongoing maintenance costs to ensure that the information in the database is accurate and up to date. Privacy and

security issues can arise where the IEMR contains sensitive patient information, so it is important to implement cybersecurity measures to protect it from unauthorized access (Schreiber & Garber, 2020).

From the IT aspect in health, medical history plays a leading role as a source of data supply to generate information in hospital management, being considered a tool that allows knowledge of costs generated by care and by specialty, linking to the information system, which allows optimization of management at the hospital level, strengthening the provision of services (Vargas y Hernández, 2019).

There are several solutions to address the challenges of managing costs and expenses associated with the IEMR that should be raised by the Ministry of Public Health and certain surrounding sectors based on the cost-benefit analysis prior to the implementation of the IEMR to determine if it is a viable investment that includes the search for financing that helps the state cover the costs of implementing the IEMR, and the implementation of fundamental security measures to protect confidential patient information (Barreiro, 2024).

In their article, Castro, Niotti, & Quiñones (2010) mention the installation of specialized Software and Hardware to store and access patient information, in addition to the ongoing training of health professionals on how to use the EHR and system updates, and a critical point is data conversion, since the data from medical records that are physically stored on paper must be converted to electronic format.

In a study by the Universidad Nacional Mayor de San Marcos, the implementation of the integration of the electronic medical record with the diagnostic support systems was carried out using middleware for outpatient consultations in the private clinic, obtaining satisfactory results in the production environment, since the system helped to have the information of the medical orders online in the electronic medical record (Gómez, 2022).

Likewise, it allows obtaining patient information from admission to managing medical appointments with other departments of the institution. The study concludes that patient care times were improved, allowing doctors to attend more appointments in 1 hour, which generated more profits. The evaluation showed as a result that the implementation of the EHR is profitable, so not only will the investment be recovered, but it will generate economic income and benefits for the patient, doctor, and the clinic as an organization (Gómez, 2022).

## **CONCLUSIONS**

Based on the review carried out, it is concluded that the implementation of the Integrated Electronic Medical Record in health systems is beneficial as a strategic investment with high results in several areas that include the improvement in the processes of quality of care, efficiency of the system and the satisfaction of the patient-health professional binomial. The IEMR represents a fundamental step towards a future in which medical care is more accessible, precise and focused on the individual needs of the patient, thereby reducing possible errors and improving the quality of care in any care center, whether public or private, by optimizing time, material and human resources.

Today, the combination of cutting-edge health technology is giving rise to a new paradigm in medical care, with the potential to improve the lives of millions of people around the world, as is the case of telemedicine. Although there is no consensus on this type of innovation, it is important to emphasize that they are necessary to improve health conditions. It is important that the state analyze and prioritize the application of this type of project, facilitating the development of strategies, promoting the work of specialized health teams and information systems, in addition to financial support, considering the viability of the IEMR, which, if applied, would not only benefit patients but also the state economy.

## **REFERENCES**

- 5G Americas. (2019). ICT for Development Studies Series: Electronic Health Records in Latin America. 5G Americas. Retrieved from: <https://brechacero.com/wp-content/uploads/2019/07/HCE-America-Latina-ESP.pdf>
- Albarracín, R. (2018). Results of the implementation of electronic medical records (EMR) at the regional level. *Journal of the Faculty of Engineering, Physical Sciences and Mathematics*, 1 (1), 5-14. Retrieved from: <https://doi.org/10.29166/ingenio.v1i1.153>
- Añel, R., García, I., Bravo, R., & Carballeira, J. (2021). Electronic medical records and prescriptions: risks and benefits detected since their implementation. *Safe design, deployment and uses. Primary Care*, 53 (1). Retrieved from: <https://doi.org/10.1016/j.aprim.2021.102220>
- Barreiro, S. (2024). Health Cost Management. Retrieved from: <https://www.auditoriamedicahoy.com.ar/biblioteca/Monografia%20gestion%20en%20costos>



- Berastain Merino, HH, Pérez Valles, CE, & Medina Sotelo, CG (2022). Single universal digital medical record in Peru: from chaos to order in medical information. *Scientific Journal*, 7(24), 78–95. <https://doi.org/10.29394/Scientific.issn.2542-2987.2022.7.24.4.78-95>
- BOE-22188. (2002). Law 41/2022, of November 14, basic regulation of patient autonomy and rights and obligations regarding information and clinical documentation. Retrieved from: <https://www.boe.es/buscar/doc.php?id=BOE-A-2002-22188>
- Bravo, M. (2023). Implementation of a clinical history module to improve care at the Ramos Larrea - Cañete Maternal and Child Center; 2020. ULADECH-Institucional . Retrieved from: [https://alicia.concytec.gob.pe/vufind/Record/ULAD\\_744e42078fef9df66693257d931ef4a1/Details](https://alicia.concytec.gob.pe/vufind/Record/ULAD_744e42078fef9df66693257d931ef4a1/Details)
- Zero Gap. (2018). Honduras advances in the implementation of Electronic Medical Records. Retrieved from: <https://brechacero.com/honduras-avanza-en-implementacion-de-historia-clinica-electronica/>
- Chá, M. (2020). Electronic medical records: resistance factors for their use by physicians. *Medical Journal of Uruguay*, 36(2), 122-143. Epub June 1, 2020. <https://doi.org/10.29193/rmu.36.2.6>
- Castro, S., Niotti, G., & Quiñones, N. (2010). Quality in health care from a medical audit. Retrieved from: [https://www.auditoriamedicahoy.com.ar/biblioteca/calidad\\_de\\_la\\_atencion\\_medica%20%20Niotti.pdf](https://www.auditoriamedicahoy.com.ar/biblioteca/calidad_de_la_atencion_medica%20%20Niotti.pdf)
- Deloitte Threat Intelligence & Analytics. (2021). The evolution of cybersecurity in the healthcare sector. Deloitte Threat Intelligence & Analytics. Retrieved from: <https://www2.deloitte.com/content/dam/Deloitte/cl/Documents/risk/cl-la- evoluci%C3%B3n-de-la-ciberseguridad-en-el-sector-de-la-salud.pdf>
- Fernández, JL (2013). Security and privacy in electronic health records: A systematic literature review. *Journal of Biomedical Informatics*, 46 (3), 541–562. Retrieved from: <https://doi.org/10.1016/j.jbi.2012.12.003>
- Fernandez, A., Agostinelli, M., Arias, M., Urrutia, M., & Maestri, W. (2021). The experience of implementing an electronic medical record in seven centers in less than a year . *Metro Ciencia*, 29(3), 32–38. <https://doi.org/10.47464/MetroCiencia/vol29/3/2021/32-38>
- Font, M., García, M., Fernández, T., & Carralero, A. (2021). Quality of hospital admission management in internal medicine services. *MEDISAN*, 25 (2), 507-525. Retrieved from: <https://www.redalyc.org/journal/3684/368466743019/html/>
- García, M., Rodríguez, I., & Cabrera, C. (2022). Digital medical record. Application of information and communication technologies in clinical management and appointment processes. *FMC - Continuing Medical Education in Primary Care*, 29 (3), 3-9. Retrieved from: <https://doi.org/10.1016/j.fmc.2022.03.001>
- Gómez, V. (2022). Implementation of the integration of the electronic medical record with diagnostic support systems using middleware for outpatient consultations in the private clinic. Retrieved from: <https://cybertesis.unmsm.edu.pe/item/bbd535fd-8fb9-47c5-84a1-a93a6e7f2fc7>
- Gonzalez, J. (2019). Latin American scientific production on digital clinical history: an analysis from Scopus. *Cuban Journal of Public Health*, 45 (3). Retrieved from: <https://www.scielosp.org/article/rcsp/2019.v45n3/e1312/>
- Gonzalez, J. (2020). Latin American scientific production on digital clinical history: an analysis from Scopus. *Cuban Journal of Public Health*, 45 (3). Retrieved from: <https://www.scielosp.org/article/rcsp/2019.v45n3/e1312/>
- Haleem, A., Javaid, M., Pratap, R., Suman, R., & Rab, S. (2021). Blockchain technology applications in healthcare: An overview. *International Journal of Intelligent Networks*, 2 , 130-139. Retrieved from: <https://doi.org/10.1016/j.ijin.2021.09.005>
- Huarac, YM (2021). Business plan to integrate IPRESS with an electronic health record (EHR) platform using blockchain technology[Master's Thesis, ESAN University. Graduate School of Business Administration]. ESAN University Institutional Repository. Retrieved from: <https://hdl.handle.net/20.500.12640/2139>.
- Indteca (2022). View of the single universal digital medical record in Peru: from chaos to order in medical information. (nd). Indteca.com. Retrieved July 20, 2024, from [https://indteca.com/ojs/index.php/Revista\\_Scientific/article/view/1079/1376](https://indteca.com/ojs/index.php/Revista_Scientific/article/view/1079/1376)
- Lasso, J., Lasso, M., Fernandez, A., Agostinelli, M., Arias, M., Urrutia, M., Maestri, W. (2021). The experience of implementing an electronic medical record in seven centers in less than a year. Retrieved from: <https://revistametrociencia.com.ec/index.php/revista/article/view/203/265>
- Nicolau, N. (2022). Electronic medical records. Preliminary reflections on law 27.706. Retrieved from: <https://repositorio.uca.edu.ar/bitstream/123456789/17846/1/historia-clinica-electronica.pdf>
- Notimerica. (2023, October 1). Colombia.- The IDB recognizes the role of Minsait's unified electronic medical record in the health sector. Notimerica. <https://www.notimerica.com/economia/noticia-colombia-bid-reconoce-papel-historia-clinica-electronica-unificada-minsait-sector-salud- 20231001120048.html>
- PAHO. (2021). Electronic medical records and the importance of how to document. *Digital transformation toolbox* . Retrieved from: <https://iris.paho.org/handle/10665.2/54805>
- PAHO. (2024). Chile advances in the development of digital health. Paho.org. Retrieved July 20, 2024, Retrieved from <https://www.paho.org/es/noticias/27-10-2022-chile-avanza-desarrollo-salud-digital>
- PAHO. (2024). Health information system. Retrieved from <https://www.paho.org/es/temas/sistemas-informacion-para-salud>
- Palacios, M. (2019). The quality of research with real-world evidence. *Medical Colombia* , 39–41. Retrieved from: <https://doi.org/10.25100/cm.v50i3.4259>
- Paladines, V., Monge, F., Monge, F., Jumbo, J.. (2020). Medical diagnosis and patient care. Mawil Editions; Mawil, 1(34). Retrieved from:<https://mawil.us/diagnostico-medico-y-atencion-al-paciente/>

- Pérez, T., Gómez, L., Álvarez, S., Cabello, L., & Mombiela, M. (2017). Electronic medical records: evolution of the doctor-patient relationship in the Primary Care consultation. *Semergen*, 43 (3), 175–181. Retrieved from: <https://doi.org/10.1016/j.semerg.2016.03.022>
- Rojas, G. (2021). The medical record: A look from bioethics. *Gaceta medica de Caracas*, 129 (3). Retrieved from: <https://doi.org/10.47307/GMC.2021.129.3.18>
- Schreiber, R., & Garber, L. (2020). Data migration: A thorny issue in electronic health record transitions—case studies and review of the literature. *ACI Open*, 04 (1), e48-e58. Retrieved from: <https://doi.org/10.1055/s-0040-1710007>
- Tsai, C., Eghdam, A., Davoody, N., Wright, G., Flowerday, S., & Koch, S. (2020). Effects of Electronic Health Record Implementation and Barriers to Adoption and Use: A Scoping Review and Qualitative Analysis of the Content. *Life (Basel, Switzerland)*, 10(12), 327. <https://doi.org/10.3390/life10120327>
- Vargas, V., & Hernandez, C. (2019). Medical history: its potential in hospital cost management. *Economicas CUC*, 40 (1). Retrieved from: <https://revistascientificas.cuc.edu.co/economicascuc/article/view/2415>