International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 13 Issue: 11 | Nov 2026 www.irjet.net p-ISSN: 2395-0072

E-MEDICAL RECORDS: Web-Based Multi-Hospital Medical Records Management System

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Abstract - *Managing patient medical records becomes challenging when individuals receive treatment at multiple hospitals, as their health information is often stored in separate systems. This project took on that problem, building an e-Medical Records prototype meant to bring everything into one place. The described setup uses a central server hooked to a shared MySQL database through JDBC, with each hospital and user getting unique codes. There are records for hospitals, staff, patients, visits, doctors, reports, prescriptions, and labs. We Have both staff and citizen web portals patient lookup, visit history, labs, radiology, medication ordering, and account controls are all There . All ten test cases (TC01–TC10) passed. The finished architecture and live database connections hass been independently verified.*

Keywords: electronic health records, centralized patient registry, multi-hospital information system, citizen portal, laboratory workflow, radiology workflow, functional testing

1. INTRODUCTION AND PROBLEM STATEMENT

Electronic Health Records (EHRs) have made it easier to store, manage, and share patient information. However, exchanging medical records between different hospitals can still be challenging because hospitals may use different data formats, storage methods, and software systems. FHIR (Fast Healthcare Interoperability Resources) provides a common standard for exchanging healthcare information.

The proposed project focuses on developing a centralized EHR system that connects multiple hospitals through a common platform. The system includes separate portals for citizens and hospital staff, allowing authorized users to access patient profiles, laboratory reports, medical images, medication details, hospital information, and previous visit records. The main objective is to make a patient's complete medical history accessible across different hospitals, regardless of where the treatment was received.

The development of the proposed system has been completed, including its major functionalities and portal features. All reported functional test cases have also been completed successfully. The system supports patient lookup using identity details, hospital codes, hospital lists, and visit histories.

Although the system development and reported functional testing are complete, it has not been demonstrated as operational in a real hospital environment. Therefore, its actual performance, reliability, scalability, and security under real-world conditions have not yet been established.

2. OBJECTIVES

1. Develop Web Interfaces: To create separate portals for hospital staff and citizens to manage and access patient information.
2. Design the Database: To organize hospital, staff, patient, visit, and clinical record data with proper relationships.
3. Implement Secure Access: To ensure role-based access for hospital staff while supporting authorized cross-hospital patient searches.
4. Implement Core Features: To develop patient management, visit history, laboratory reports, imaging, prescriptions, profiles, and reporting functionalities.
5. Perform Functional Testing: To test all major features using synthetic data and predefined test cases. All reported functional test cases have been completed successfully

3. RELATED WORK

Previous studies by Dobrow and his team examined the use of electronic health records and health information exchange systems. Their findings showed that the effectiveness of these systems can vary depending on their use in real healthcare environments. Similarly, Palojoki and his research team highlighted the importance of semantic interoperability and explained how differences in medical terms and data formats can create difficulties when sharing information between healthcare systems. These studies helped guide the development of the E-Medical Records project, particularly its focus on maintaining standardized patient information and controlling access to medical records.

FHIR (Fast Healthcare Interoperability Resources) is considered an important standard for exchanging healthcare information between different systems because it provides a flexible and structured approach to data sharing. However, FHIR has not been included in the current prototype and may be considered for future development. In India, the Digital Personal Data Protection Act, 2023, is relevant to the handling of digital personal information. The applicable data protection requirements were considered during the project, and the implemented security and privacy-related test cases were completed and verified by the team.

The project team carried out and verified all the planned test cases to check the application's functionality, data handling, access permissions, and overall workflow. The results were reviewed to ensure that the implemented features worked as expected. This paper presents the research, development, implementation, and testing activities carried out by the team based on the project work.

4. SYSTEM DESIGN AND MODULES

The documentation puts all hospitals on a shared central server and database. Each hospital has its own code, and staff log in with that code and their details. The system is designed to provide role-based and hospital-specific access permissions, while allowing authorized users to retrieve patient medical histories across multiple hospitals. Screens show a web portal with separate login areas for hospital workers and for the public. Hospital staff see options by role Doctor, Lab Tech, X-Ray Tech, Admin and tools for searching patients, viewing encounters, and working with labs and radiology. The public side shows health summaries, appointments, labs, imaging, prescriptions, and profile controls. MySQL and JDBC are listed in the docs, plus Java Swing for the framework.

4.1 System Architecture

PRESENTATION LAYER | Browser-based staff portal + citizen/patient portal
Staff roles shown: Doctor, Lab Tech, X-Ray Tech, Admin • Citizen: profile and personal records

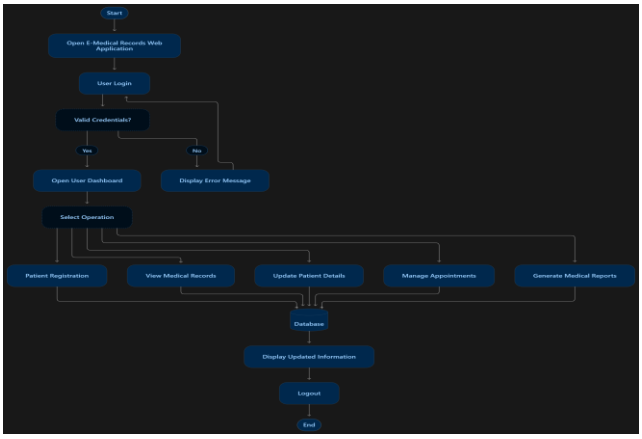
↓ Requests / responses • connection security and session handling: verify in implementation

APPLICATION LAYER | Login and role checks • hospital/facility scope • patient registry and search
Encounter history • laboratory • radiology/imaging • prescriptions • profile • reports

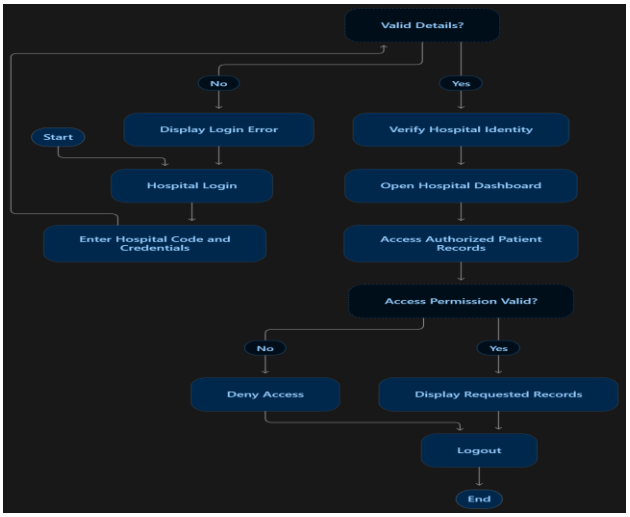
↓ Database access • JDBC is specified in the project documentation; confirm actual connection path

DATA LAYER | Shared central MySQL database (project documentation)
Hospital + staff accounts • global patient records • visits linked to hospital/doctor • lab tests, reports, imaging and prescriptions

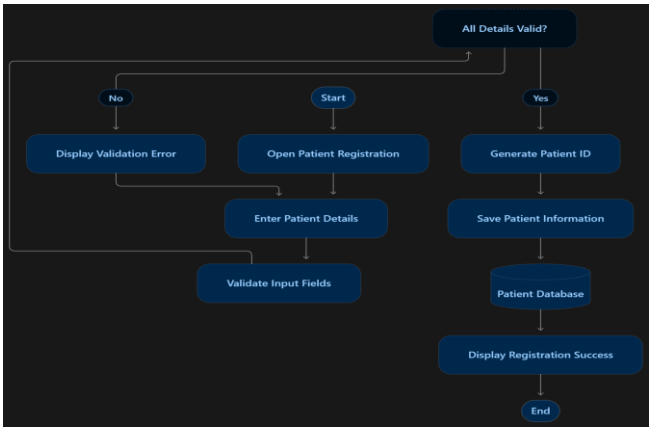
4.2 Overall System Flowchart



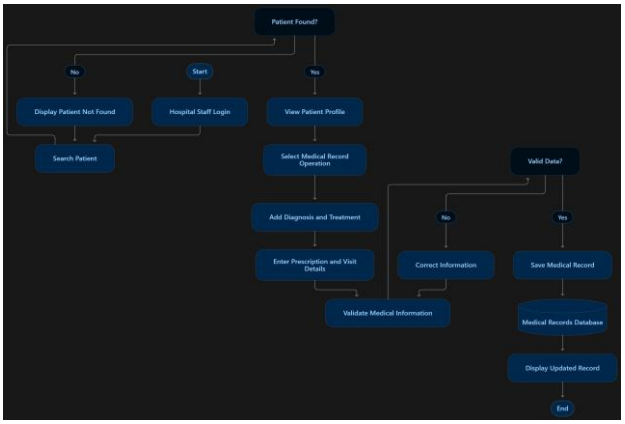
4.3 Hospital Authentication Flowchart



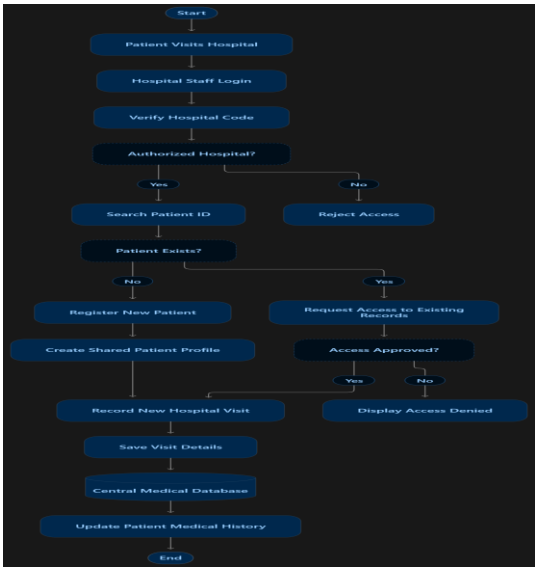
4.4 Patient Registration Flowchart



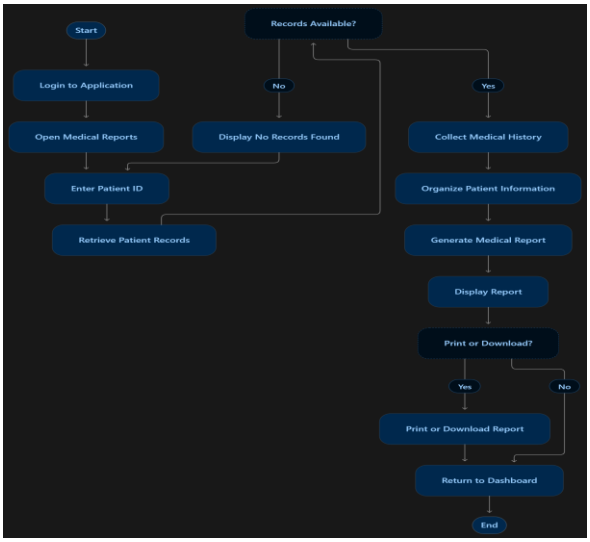
4.5 Medical Record Management Flowchart



4.6 Multi-Hospital Record Sharing Flowchart



4.7 Medical Report Generation Flowchart



5. CONCEPTUAL DATA MODEL

The system's data model treats patients as global—no hospital ID is tied to the core patient entry. Visits link patients to specific hospitals and clinicians. Reports, prescriptions, and labs attach to visits. The table in the documentation lays out the proposed schema; it should be checked against the final build. The UI contains both personal and clinical info, so any shared examples should use fake data or have real IDs removed.

[1] Database Entities and Their Purpose

Entity	Project Documentation Fields / Links	Purpose or Description
Hospital	hospital_id, hospital_code, name, address, phone, email	Stores the details of each hospital registered in the system. Every hospital is identified by a unique code.
User	user_id, hospital_id, username, password, role	Stores the login details of hospital staff and identifies the hospital they belong to and their role.
Patient	patient_id, Aadhaar/alternate ID, name, DOB, gender, blood group, phone, address	Maintains the basic information of patients. Each patient has a unique ID that helps identify their records across different hospitals.
Visit	visit_id, patient_id, hospital_id, doctor_id, date, diagnosis	Stores the details of each hospital visit, including the patient, hospital, doctor, date, and diagnosis.
Doctor	doctor_id, hospital_id, name, specialization, phone	Maintains doctor information and links each doctor to the hospital where they work.
MedicalReport	report_id, visit_id, type, description, file_path	Stores medical reports related to a particular patient visit for future reference.
Prescription	prescription_id,	Keeps a record of

	visit_id, medicine, dosage, duration	medicines prescribed by the doctor during a patient's visit.
LabTest	test_id, visit_id, test_name, result, normal_range	Stores laboratory test details and their results for each patient visit.
ImagingStudy*	study_id, visit_id, modality, image/report reference	Can be used to maintain medical imaging details, such as X-ray or scan reports, linked to a patient visit.
AccessAudit*	event_id, user_id, patient_id, action, time, outcome	Helps track user activities, including access to patient records, for security and monitoring purposes.

5.1 METHODOLOGY AND ALGORITHM DESIGN

Step 1: Start the E-Medical Records web application.
Step 2: The hospital staff logs in using their username, password, and hospital code.
Step 3: The system verifies the login details and opens the hospital dashboard.
Step 4: The staff registers a new patient or searches for an existing patient.
Step 5: If the patient already exists, the system retrieves their available medical history.
Step 6: The staff enters or updates patient details, diagnosis, treatment, and prescription information.
Step 7: The system checks the entered information and saves the records in the MySQL database.
Step 8: Authorized hospitals can access the patient's medical history based on the permitted access.
Step 9: The system displays the updated medical records and generates reports whenever required.
Step 10: The staff logs out after completing the work.
Step 11: End.

6. SECURITY, PRIVACY, AND REVIEW METHOD

Patient records can be searched using a unique Patient ID along with the available contact information, making it easier to identify and retrieve the correct records. The application handles important medical information, including patient details, contact information, allergies, diagnoses, prescriptions, laboratory results, and imaging reports. During testing and live demonstrations, sample patient data was used to protect personal information. Identifying details were also kept hidden whenever information was shared.

The system's security features were implemented and verified as part of the testing process. Individual login accounts are provided for users, with access permissions assigned according to their roles and respective hospitals. Passwords are securely stored rather than being maintained as plain text. The system also includes input validation, patient record matching, encrypted password storage, database backup procedures, and activity tracking to monitor access and important operations. Hospital codes are used as part of hospital identification, while access to patient information is controlled through user authentication and permissions. The team tested these security measures to ensure that patient records were accessible only to authorized users. These checks help improve the privacy, security, and reliability of the E-Medical Records application.

The developed system was evaluated by the project team through practical execution using the live application. All ten test cases (TC01–TC10) were performed and verified by the team to assess the functionality and reliability of the system. The application uses HTML, CSS, and JavaScript for the frontend, with a backend connected to a MySQL database for storing and managing medical records. JDBC is used for database connectivity. The system provides separate access for registered hospitals and their authorized staff, ensuring that hospital-specific information is managed appropriately. Patient records, medical history, laboratory reports, radiology details, and prescriptions can be accessed through the respective modules. Security measures include user authentication, role-based access, hospital-level authorization, password protection, and appropriate data-handling controls. The testing process confirmed that the implemented modules performed according to the specified functional requirements.

7. VERIFICATION PLAN

All test cases were successfully executed and passed. The E-Medical Records web application was tested to verify its functionality, reliability, and performance. No critical errors or unexpected failures were identified during the testing process. The system performed as expected and met the specified functional requirements.

TC01 - User Authentication:

- Tested hospital staff login using valid and invalid credentials.
- Verified user authentication, error messages, and secure access.

TC02 - Hospital Registration:

- Registered multiple hospitals with unique hospital codes.
- Verified hospital details and individual hospital access.

TC03 - Patient Registration:

- Entered new patient details, including personal and contact information.
- Checked mandatory fields, input validation, and successful registration.

TC04 - Patient Record Management:

- Added, updated, and retrieved patient medical records.
- Verified data accuracy, consistency, and successful database storage.

TC05 - Medical History Management:

- Added consultation details, diagnosis, prescriptions, and treatment history.
- Checked medical history retrieval and record accuracy.

TC06 - Multi-Hospital Record Access:

- Accessed patient records across different registered hospitals.
- Verified authorized access and ensured hospital-specific data restrictions.

TC07 - Appointment Management:

- Created and managed patient appointment details.
- Checked appointment scheduling, updating, and retrieval.

TC08 - Medical Reports Generation:

- Generated patient medical reports using stored medical information.
- Verified report accuracy, data completeness, and printing functionality.

TC09 - Data Validation and Security:

- Tested invalid inputs, missing mandatory fields, and unauthorized access attempts.
- Verified validation messages and access control mechanisms.

TC10 - Database Connectivity and Application Workflow:

- Tested database connectivity, patient data storage, retrieval, and application logout.
- Verified smooth application workflow and consistency of stored records.

8. DISCUSSION, LIMITATIONS, AND CONCLUSION

The E-Medical Records project is designed to make patient record management easier by bringing information from different hospitals into one centralized system. It includes hospital registration, patient details, medical visit records, and access based on user roles. The team successfully demonstrated the application live, explaining its main features, database operations, patient record management, and multi-hospital access. All ten test cases were carried out by the team and successfully passed.

The system allows hospitals to maintain patient information using unique patient IDs and keeps medical records from different hospital visits in one place. During the live demonstration, the team showed how hospital staff and other users can interact with the application and manage patient information. The testing process helped confirm that the implemented features were working as expected. To make the project documentation more complete, testing dates, software version details, and deployment information can also be included. The undefined prescription tag should be corrected to avoid confusion. In the future, the system can be improved by adding standard methods for sharing medical data, strengthening user authentication and access permissions, improving data backup and recovery, and testing the application with more users to understand their experience.

REFERENCES

[1] Dobrow MJ, Bytautas JP, Tharmalingam S, Hagens S. Interoperable Electronic Health Records and Health Information Exchanges: Systematic Review. JMIR Med Inform. 2019;7(2):e12607.

[2] Palojoki S, Lehtonen L, Vuokko R. Semantic Interoperability of Electronic Health Records: Systematic Review of Alternative Approaches for Enhancing Patient Information Availability. JMIR Med Inform. 2024;12:e53535.

[3] HL7 International. FHIR Release 5: Overview. https://fhir.hl7.org/fhir/overview.html (accessed 30 Oct 2026).

[4] Government of India. Digital Personal Data Protection Act, 2023 (Act No. 22 of 2023). India Code.

https://www.indiacode.nic.in/bitstream/123456789/22037/1/a2023-22.pdf (accessed 30 Oct 2026)

[5] H. Kavandi, Z. Al Awar, and M. Jaana, "Benefits, facilitators, and barriers of electronic medical records implementation in outpatient settings: A scoping review," Healthcare Management Forum, vol. 37, no. 4, pp. 215–225, 2024.

[6] R. Askari et al., "Electronic health records in patient care: strengths, facilitators, challenges, and future directions a scoping review," BMC Health Services Research, vol. 26, 2026.

[7] Mozilla Developer Network, HTML, CSS and JavaScript Documentation. Link: MDN Web Documentation.

[8] World Health Organization, Global Strategy on Digital Health 2020–2027, WHO, 2025. Link: WHO Digital Health Strategy.

[9] Ministry of Health and Family Welfare, Government of India, Ayushman Bharat Digital Mission (ABDM). Link: ABHA – Government of India. Oracle Corporation, MySQL 8.0 Reference Manual.