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Interoperability in Healthcare using FHIR: A Systematic Literature Review

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TREO Talk Paper

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Abstract

Fast Healthcare Interoperability Resources (FHIR) is an international standard for healthcare information exchange. It is an area of research that has become ever more prevalent as medical records information exchange is a critical unmet need in clinical practice. The primary driver of this research is to identify the potential and the challenges of FHIR technology in the current and future healthcare systems. A secondary objective is to identify any gaps in the recent research to build a path for future research. Considering the highly specialized organization of the healthcare system in developed countries, patients, particularly those suffering from chronic or multi-organ diseases, generally receive care from different hospitals, medical laboratories, and medical centers. Even if electronic health records (EHR), replaced paper to store documents, the medical information is often kept in different and incompatible systems, even in the same medical center, without the possibility of exchange, making it difficult to keep track of patient data and make correct diagnostic or treatment decisions. Furthermore, this prevents data from being shareable and, thus, interoperable. The difficulty in improving healthcare interoperability across medical providers impacts physicians, patients, and public health. Therefore, multi-site clinical healthcare organizations must transform all healthcare data into a standard format and use standardized terminologies to allow records exchange.

This systematic literature review explores HL7 and FHIR standards and analyzes how FHIR technology can improve interoperability and exchange data between different hospital services. The research questions investigated are the applications of FHIR and the potentials of FHIR in the future. The research followed a PRISMA-based approach for this reporting. The papers were divided according to four main topics: (1) general healthcare information management, (2) interoperability technology related to mobile applications, (3) specific clinical application of FHIR technology, and (4) clinical trial related to FHIR technology.

The rapid development and acceptance of EHR and standards to exchange EHR have improved various aspects of health practices and patient care. FHIR technology is emerging as a valuable tool, driving the healthcare information exchange industry to consider how their platforms align with FHIR. The systematic literature review of articles about FHIR led to identifying the main topics associated with FHIR in digital health. The interest in these technologies is constantly growing in the healthcare community. FHIR is an emerging clinical data standard for modeling and integrating structured and unstructured EHR data for various clinical research applications. The advent of the FHIR standard will bring significant advancements to reliability and standardization. In addition, FHIR will empower researchers and application developers to access enormous volumes of interoperable data.

The goal was to evaluate the usability and capabilities of HL7 FHIR to design and implement interoperable personal medical data. FHIR is a reliable alternative to outdated document-centric methods by directly exposing discrete data elements as services. The results of this technology are beneficial, especially for chronic patients that require care assistance from many specialist physicians, regardless of the location of the hospital or medical center in which they receive health care. In addition, the study can be of interest to researchers and health professionals to address the current interest in FHIR in the scientific community and its potential impact on digital health.