FHIR Analytics – Pragmatic Review of Recent Studies

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Abstract. Background: Big Data Analytics is changing the way medical information is processed. FHIR aims to provide a robust infrastructure to enable the interoperability of clinical information. Objectives: Analyze the ongoing development of analytical implementations of FHIR. Methods: Pragmatic Review of current research and implementation projects. Results: US healthcare providers have implemented FHIR in their products, enabling scalable analytical tools. Europe demonstrated interest in FHIR. Conclusion: The potential of FHIR analytics is a value-added use case of the implementation of FHIR.

Keywords. electronic health records, analytics, HL7 FHIR

1. Introduction

In recent years, health-technology providers have demonstrated public interest in using FHIR [1]. Based on HL7v2, the Fast Healthcare Interoperability Resources (FHIR) data standard provides a framework for enhancing the transmission of electronic health records (EHR) [2]. Through the FHIR data model, technology companies and institutions are trying to bridge the implementation gap between the standard and other requirements to develop scalable systems like cloud technologies [3, 4]. This work aims at the examination of the current state of usage of FHIR for analytics in Europe, primarily German-speaking countries.

2. Methods

This work is a systematic overview of the ongoing development of FHIR and the current situation of its application. The research started with the search terms "FHIR" and "analytics" on Google Scholar and PubMed. Because of low results [5], we conducted a pragmatic review [6] in November 2019, including also grey literature. The search strategy and content analysis aligned with the PRISMA Statement.

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3. Results

FHIR already found its application in analytical circumstances outside of Europe. Researchers were able to predict sepsis based on FHIR-based datasets [7, 8], demonstrated how to deploy clinical predictive models through FHIR Web Services [9], and provided a clinical statistics and analysis platform using FHIR, and the web framework Shiny [10]. There are also FHIR applications in the industry. Different EHR providers already provide FHIR-structured data. Epic, Cerner, and Allscripts, for example, implemented FHIR into their products to process data requests via a platform-neutral API. [1]

Cloud providers also engage with FHIR. Google and Azure implemented FHIR into the GCP and Azure to store and analyze medical data on a large scale. [3, 4]

Technology Startups have recognized the analytical capabilities of FHIR. doc.ai, an app that provides personalized medicine, and SPHER, a company that automates the process of controlling audit files, use FHIR to store data in a structured way. [11, 12]

With the Medical Informatics Initiative, Germany also became more committed to the interoperability of clinical data. Besides the Basisprofilierung STU3 project from HL7 Deutschland e.V., FHIR was used to support clinical decisions and to build a distributed phenotyping analytics platform. [13-15]

Austria also enhances the exchange of health data [16, 17]. Researchers underline the use and benefits of standardized data in analytical approaches [18-20] Further, a monitoring system was already developed with FHIR. [21]

4. Discussion and Conclusion

Through FHIR, one of the last industries has found its way to functioning interoperability, yet the state of FHIR analytics is at an early stage [1, 5]. Combining efficiently stored medical data with machine learning algorithms will hopefully leverage healthcare to the next level. The work was supported by the Tiroler Wissenschaftsfond.

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