

# Evaluation of the Proposed Arden Syntax v3.0 to Represent Query Data Mappings Using FHIR

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**Abstract.** Context: Arden Syntax is a standard that encodes knowledge as Medical Logic Modules but lacks a standard query data model and terminology. Objective: Assess FHIR-enabled data access in a proposed version of Arden Syntax. Method: Queries in 340 MLMs were tabulated. Result: FHIR can serve as the Arden Syntax data model, but nonstandard terminologies still impede interoperability. Conclusion: The proposed Arden Syntax v3.0 FHIR-enabled data access is adequate as a query data model for MLMs.

**Keywords.** Clinical decision support systems, knowledge representation

## 1. Introduction

Arden Syntax is a formalism supervised by Health Level Seven International (HL7) for representation of procedural medical knowledge as medical logic modules (MLMs) [1]. One popular formalism for facilitating data interoperability is the HL7 Fast Healthcare Interoperability Resources (FHIR).

HL7 is finalizing a new version (v3.0) of the Arden Syntax that accommodates FHIR-enabled data access with an updated version of FHIR. This provides for direct reference to FHIR resources, with attributes of the Patient, Observation, Condition and Encounter resources specifically identified, using a dot notation to refer to specific attributes of the resource such as name and value Date. These basic FHIR resources can be extended through references to FHIR profiles and externally-maintained vocabularies and value sets. The present work was undertaken to assess to what extent these new constructs would represent adequately query data mappings in a typical knowledge base of MLMs encoded using prior versions of the Arden Syntax.

## 2. Methods

A previously assembled convenience sample of MLMs, encoded using prior versions of the Arden Syntax, was examined. MLMs were tabulated to assess the extent to which their query data mappings could be represented by the proposed Arden Syntax v3.0 referencing FHIR Release 4B, version 4.3.0.

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### **3. Results**

A total of 340 MLMs were pooled from 5 source CDS systems, including 24 from 2 vendor knowledge bases and 316 from 3 academic medical centers. MLMs concerned with lab tests were the most common ( $138/340 = 41\%$ ), followed by clinical assessment ( $75=22\%$ ) and medication ( $45=13\%$ ). The remainder addressed administrative and miscellaneous topics. Each MLM contained at least one READ statement with a data query. A total of 3268 queries were identified, and the data elements therein were assessed whether they could be represented using the latest constructs in the proposed Arden Syntax v3.0 and the latest version of FHIR. All the data elements in these queries could be so represented. However, 13% of the MLMs focused on decision support for medication use, and this is not one of the basic resources that is supported; nevertheless, these query data elements could be referenced through FHIR profiles. While Arden Syntax v3.0 will contain constructs to map to standard terminologies, this convenience sample of MLMs used mostly nonstandard terminology, which would limit their interoperability even with the use of the new constructs.

### **4. Conclusions**

The proposed Arden Syntax v3.0, providing constructs for direct references to standard FHIR resources, is adequate for encoding query data elements in a typical knowledge base of MLMs. Use of standard terminologies in FHIR queries supported by the new syntax will enhance interoperability, thereby promoting knowledge sharing. As additional FHIR resources mature and become normative, the Arden Syntax would benefit from their inclusion as basic resources.

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### **References**

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