Testing HL7® FHIR® Implementation Guides with Inferno

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Inferno Overview

• Open Source FHIR Testing
  • Inferno is a streamlined FHIR Server testing tool that is use-case / implementation guide focused.

• ONC 2015 Edition Cures Update API Tests (Program Edition)
  • Inferno provides tests verifying conformance to the Standardized API for Patient and Population Services criterion § 170.315(g)(10) in the 2015 Edition Cures Update.

• Additional FHIR Implementation Guide Tests
  • Inferno will make it easier to write or reuse tests assessing conformance to other FHIR Implementation Guides with flexibility to test non-FHIR requirements.
Session Focus

• Testing the **ONC 2015 Edition Cures Update API Criterion** with Inferno

• Hands-on overview of the standards required for certification
Try Inferno
https://inferno.healthit.gov/inferno

Download and run locally
https://github.com/onc-healthit/inferno-program
INFERNO PROGRAM EDITION


https://inferno.healthit.gov/reference-server/r4

START TESTING

Or test Inferno against Inferno Reference Server
170.315(g)(10) Standardized API for Patient and Population Services

Criterion integrates multiple standards and implementation specifications

FHIR Release 4.0.1
US Core Implementation Guide STU3 Release 3.1.0
Bulk Data Access IG: STU1

OAuth 2.0
App Authorization using the SMART App Launch Framework IG v1.0.0
Authentication using OpenID Connect Core 1.0
System Authorization using the SMART Backend Services

USCDI v1 Data Classes / Elements
Additional requirements for certain optional or permissive aspects of the guides.
For example: Required support for token refresh, Read only, etc.
170.315(g)(10) Test Procedure Sections

- **Application Registration**
  - Functional requirement for apps to register with authorization server
- **Secure Connection**
  - Follow security requirements for [US Core IG](https://example.com) and [SMART IG](https://example.com)
- **Authentication and Authorization for Patient and User Scopes**
  - Conform with [SMART IG](https://example.com)
- **Patient Authorization Revocation**
  - Functional requirement to enable patients to revoke authorization at any time
- **Authentication and Authorization for System Scopes**
  - Conform with Backend Services Authorization section of [Bulk IG](https://example.com)
- **Token Introspection**
  - Functional requirement for authorization server to validate issued tokens
- **Supported Search Operations**
  - Conform with [US Core IG](https://example.com) for single patients; [Bulk IG](https://example.com) for multiple patients
- **Data Response**
  - Conform with [US Core IG](https://example.com) and [USCDI](https://example.com) for single patients; [Bulk IG](https://example.com), [US Core IG](https://example.com), and [USCDI](https://example.com) for multiple patients
- **Documentation**

Test procedure allows flexibility in how to test and is tool agnostic

“Functional requirements” are those that do not require a standards-based implementation but still need to be demonstrated
Inferno 170.315(g)(10) Test Approach

• Acts as a very demanding single-patient and multi-patient client application
  • Tests integrated authorization and data access
• Avoids redundant testing
• Servers can provide their own complete test data
  • Inferno leverages FHIR built-in conformance rules to ensure data returned is correct and internally consistent
  • Inferno tracks which MUST SUPPORT data elements have been provided and which have not
• Inferno provides an interface to log visual inspection or attestation when automated testing not possible

Test Structure
• 5 high level scenarios
• 51 component sequences
• 380 individual tests

A typical testing session performs thousands of HTTP requests
WALKTHROUGH

https://inferno.healthit.gov/
170.315(g)(10) Test Data and Installation

• **Test Data**
  • Inferno tests do not require a specific test data set to be loaded by system under test
  • Complete US Core FHIR test data is available if needed
  • Additionally, scripts are provided to generate your own unique, complete synthetic data designed for testing

• **Installation**
  • Reference server available but users encouraged to download and run locally; data cleared periodically
  • Local installation allows testing behind firewall and data can be retained
  • Docker-based installation is recommended, additional deployment options available
  • Scripts provided to download and install ValueSets locally
170.315(g)(10) Test Procedure Coverage

- Inferno covers entire test procedure
- Inferno prompts tester to document ‘functional’ requirements
- Test Matrix provides complete mapping and all test information
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