



RESOURCE AND PATIENT MANAGEMENT SYSTEM

Electronic Health Record

FHIR® API Access 4DH FHIR® APIs API Technical Manual

FHIR® R4, US Core 6.1.0 / USCDI v3, SMART App Launch 2.0.0,
Bulk Data 2.0.0

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Revision History

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3.1	6/26/25	Cynthia Bolognese	All	All	• Format • Added watermark to the title page at top and bottom • Repaired footers to have consistent formatting • Repair the footers on the contact page • Changed table references to use the cross-reference function • Changed Bdytxt to 12pt • Update header and footer of contact section to match other sections • Updated Heading 4 titles for correct spacing
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1.0 Introduction

The 4DH FHIR® API provides standards-based access to patient health information from the Indian Health Service (IHS) Four Directions Hub (4DH). These APIs support SMART on FHIR®, HL7 FHIR R4, US Core 6.1.0, USCDI v3, and Bulk FHIR 2.0.0, and are designed to meet ONC HTI-1 requirements for the Standardized API for Patient and Population Services.

This guide describes the available FHIR resources, API endpoints, authentication workflows, and usage requirements for third-party application developers integrating with IHS systems. The APIs provide secure access to patient-authorized data and population-level export capabilities; they do not include provider-facing HIE query or eHealth Exchange functionality.

This document is intended for developers, implementers, and organizations building applications that interact with the 4DH FHIR API.

2.0 Requirements and Attributes

The FHIR® R4 resources listed here align with the United States Core Data for Interoperability (USCDI) v3 data elements.

2.1 Software Components and Configurations

IHS does not specify required software components to implement the IHS 4DH FHIR API's.

The following components are required to interact with the IHS 4DH FHIR API's:

- The HL7 standards as defined by US Core 6.1.0 / USCDI v3, SMART App Launch 2.0.0, Bulk Data 2.0.0.
- To test your application, include a REST client, such as Postman, or a high-level language that can make HTTP requests according to the specified standards.

2.2 Application Registration Requirements and Attributes

IHS uses SMART on FHIR to provide secure access to patient data.

An application client can be dynamically registered with the SMART on FHIR authorization system by providing the following attributes as defined in the OpenID Connect Dynamic Client Registration specifications 1.0–draft 19.

- application_type
- redirect_uris
- client_name
- logo_uri
- subject_type_sector_identification_uri
- token_endpoint_auth_method
- jwks_uri
- userinfo_encrypted_response_alg
- user_encrypted_response_enc
- contacts
- and request_uris.

3.0 4DH API URLs

To use the 4DH APIs to retrieve valid data, the user must be a registered patient or provider. Developers wishing to develop or run their applications against demo data in the 4DH system, should contact ITsupport@ihs.gov. 4DH API endpoints are list in Table 3-1.

Table 3-1: 4DH API Endpoints

URL	Address
Service Base URL	https://ihs4dhapim.ihs.gov/base-url/base-url
Single Patient EndPoint	https://ihs4dhapim.ihs.gov/FHIR/r4
Multi-patient Bulk FHIR EndPoint	https://ihs4dhapim.ihs.gov/bulkFHIR/r4

4.0 Terms and Conditions

The 4DH FHIR® API provides secure, standards-based access to patient data using HL7 FHIR R4, US Core 6.1.0, SMART App Launch 2.0.0, and Bulk FHIR 2.0.0. These Terms and Conditions govern the use of the API by authorized third-party applications and users. By accessing the API, developers and applications agree to comply with all applicable federal laws, IHS policies, and the requirements described in this document.

4.1 Summary

Access to the 4DH FHIR API is intended for approved applications that have successfully completed SMART on FHIR client registration and obtained the appropriate authorization tokens. API responses reflect data available within IHS systems based on the user's authenticated scope, patient consent, and IHS access policies.

API consumers must ensure their applications use the data only for authorized purposes related to patient access, clinical care, or other activities permitted under applicable federal regulations.

4.2 Security of Information

The 4DH FHIR API is part of an Indian Health Service (IHS) U.S. Government information system and contains sensitive health information. All requests, responses, and downloaded data are subject to federal requirements including:

- HIPAA Privacy and Security Rules
- HITECH Act
- The Privacy Act of 1974
- Applicable IHS security and access control policies

Developers and applications must implement appropriate safeguards to protect access tokens, refresh tokens, client secrets, and any stored or transmitted FHIR resources. Unauthorized access or misuse of data is prohibited.

4.3 Agreement & Disclaimers

4.3.1 General Disclaimer

Use of the API is subject to system monitoring and auditing. IHS may collect aggregate, de-identified usage statistics for security, performance monitoring, certification reporting, and administrative purposes. IHS makes no guarantees regarding service availability and may modify or discontinue endpoints as required by policy or regulation.

4.3.2 Medical Disclaimer

The information provided by the IHS 4DH is based on the official health record at the time it was last updated from the facilities. Any incorrect information should be referred to the individual facilities.

The API returns information sourced from the official patient health record at the time of extraction. Developers must ensure their applications clearly inform users that the data may not represent real-time updates. Any inaccuracies should be directed to the patient's healthcare facility.

4.3.3 Download

Applications that download FHIR resources—whether JSON, XML, or NDJSON (Bulk FHIR)—are responsible for ensuring that downloaded data is:

- Stored securely
- Accessed only by authorized users
- Transmitted through secure channels
- Disposed of in accordance with federal requirements
- IHS is not responsible for the security of data once it is retrieved by a third-party application.

4.3.4 Changes to API Terms

IHS may update these Terms and Conditions to comply with ONC certification requirements, federal security policies, or updates to the 4DH platform. Revised terms will be published in future versions of this API guide. Continued use following updates constitutes acceptance of the revised terms.

5.0 FHIR Mapping

The following sections describe FHIR R4 resources available with the 4DH APIs. Access to data is only for authorized patients and providers.

IHS uses SMART on FHIR to provide secure access to patient data.

For a full list of capabilities, see the FHIR CapabilityStatement at the [Base_url]/metadata.

Example FHIR responses are available from the 4DH Team upon request.

5.1 USCDI: Allergies and Intolerances

Components:

- Substance (Medication)
- Substance (Drug Class)
- Reaction

5.1.1 FHIR Resource: AllergyIntolerance

US Core Implementation Guide: [AllergyIntolerance Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: clinical-status [token], patient [reference]

5.1.1.1 Syntax:

- GET [Base_URL]/AllergyIntolerance?patient=[id]
- POST [Base_URL]/AllergyIntolerance/_search (parameters are x-www-form-urlencoded)

5.1.1.2 Example Request:

- GET [Base_URL]/AllergyIntolerance?patient=100000026

5.2 USCDI: Assessment and Plan of Treatment

Components:

- Assessment and Plan of Treatment
- SDOH Assessment

5.2.1 FHIR Resource: CarePlan

US Core Implementation Guide: [CarePlan Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: patient [reference], category [token], status [token], date [date]

5.2.1.1 Syntax:

- GET [Base_URL]/CarePlan/[id]
- GET [Base_URL]/CarePlan/[id]&category=assess-plan
- GET [Base_URL]/CarePlan?patient=[id]&category=assess-plan&status={system}|[code]&date=geYYYY-MM-DD&date=leYYYY-MM-DD
- POST [Base_URL]/CarePlan/_search (parameters are x-www-form-urlencoded)

5.2.1.2 Example Request:

- GET [Base_URL]/CarePlan/patient=100000026&category=assess-plan

5.3 USCDI: Care Team Member(s)

Components:

- Care Team Member Name
- Care Team Member Identifier
- Care Team Member Role
- Care Team Member Location
- Care Team Member Telecom

5.3.1 FHIR Resource: CareTeam

US Core Implementation Guide: [CareTeam Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: patient [reference], status [token], role [token]

5.3.1.1 Syntax:

- GET [Base_URL]/CareTeam/[id]

- **GET** [Base_URL]/CareTeam?patient=[id]&status={system|}[code]
- **POST** [Base_URL]/CareTeam/_search (parameters are x-www-form-urlencoded)

5.3.1.2 Example Request:

- **GET** [Base_URL]/CareTeam?patient=100000139&status=active

5.4 USCDI: Clinical Notes

Components:

- Consultation Note
- Discharge Summary Note
- History & Physical
- Procedure Note
- Progress Note

5.4.1 FHIR Resource: DocumentReference

US Core Implementation Guide: [DocumentReference Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: _id [token], patient [reference], status [token], category [token], type [token], date [date], period [date]

5.4.1.1 Syntax:

- **GET** [Base_URL]/DocumentReference?_id=[id]
- **GET** [Base_URL]/DocumentReference?patient=[id]
- **GET** [Base_URL]/DocumentReference?patient=[id]&category=clinical-note
- **GET** [Base_URL]/DocumentReference?patient=[id]&category=clinical-note&date=geYYYY-MM-DD&date=leYYYY-MM-DD
- **POST** [Base_URL]/DocumentReference/_search (parameters are x-www-form-urlencoded)

Returns the Document Reference representation of all the data.

5.4.1.2 Example Request:

- **GET** [Base_URL]/DocumentReference?patient=100000139

5.5 USCDI: Clinical Tests

Components:

- Clinical Test
- Clinical Test Result/Report

5.5.1 FHIR Resource: Observation

US Core Implementation Guide: [Observation Clinical Result Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: identifier [token], patient [reference], subject [reference], performer [reference], status [token], code [token], date [date], category [token]

5.5.1.1 Syntax:

- GET [Base_URL]/Observation/[id]
- GET [Base_URL]/Observation?category=laboratory
- GET [Base_URL]/Observation?patient=[id]&category=laboratory&code={system}[code]
- GET [Base_URL]/Observation?patient=[id]&category=laboratory&date=geYYYY-Y-MM-DD&date=leYYYY-MM-DD
- POST [Base_URL]/Observation/_search (parameters are x-www-form-urlencoded)

5.5.1.2 Example Request:

- GET
[Base_URL]/Observation?patient=100000026&category=laboratory&code=577 8-6

5.5.2 FHIR Resource: DiagnosticReport

US Core Implementation Guide: [Profile for Laboratory Results Reporting](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: identifier [token], patient [reference], status [token], code [token], date [date], category [token]

5.5.2.1 Syntax:

- **GET** [Base_URL]/DiagnosticReport/[id]
- **GET** [Base_URL]/ DiagnosticReport?category=laboratory
- **GET** [Base_URL]/ DiagnosticReport?patient=[id]&category=http://terminology.hl7.org/CodeSystem/v2-0074|LAB&code={system|}[code]
- **GET** [Base_URL]/ DiagnosticReport?patient=[id]&category=http://terminology.hl7.org/CodeSystem/v2-0074|LAB&date=geYYYY-MM-DD&date=leYYYY-MM-DD
- **POST** [Base_URL]/ DiagnosticReport /_search (parameters are x-www-form-urlencoded)

5.5.2.2 Example Request:

- **GET** [Base_URL]/ DiagnosticReport?patient=100000026&category=http://terminology.hl7.org/CodeSystem/v2-0074|LAB

5.6 USCDI: Diagnostic Imaging

Components:

- Diagnostic Imaging Test
- Diagnostic Imaging Report

5.6.1 FHIR Resource: DiagnosticReport

US Core Implementation Guide: [Profile for Report and Note Exchange](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: patient [reference], status [token], code [token], date [date], category [token]

5.6.1.1 Syntax:

- **GET** [Base_URL]/DiagnosticReport?category=http://loinc.org|LP29684-5
- **GET** [Base_URL]/DiagnosticReport?category= http://loinc.org|LP29684-5&patient=[id]
- **GET** [Base_URL]/DiagnosticReport?category= http://loinc.org|LP29684-5&patient=[id]&code={system|}[code]

- **GET** [Base_URL]/DiagnosticReport?category=http://loinc.org|LP29684-5&patient=[id]&date=geYYYY-MM-DD&date=leYYYY-MM-DD
- **POST** [Base_URL]/DiagnosticReport/_search (parameters are x-www-form-urlencoded)

5.6.1.2 Example Request:

- **GET** [Base_URL]/DiagnosticReport?category=http://loinc.org|LP29684-5&patient=100000026]

5.7 USCDI: Encounter Information

Components:

- Encounter Type
- Encounter Diagnosis
- Encounter Time
- Encounter Location
- Encounter Disposition

5.7.1 FHIR Resource: Encounter

US Core Implementation Guide: [Condition Encounter Diagnosis Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: _id [token], identifier [token], patient [reference], class [token], type [token], status [token], date [date], location [reference],discharge-disposition [token]

5.7.1.1 Syntax:

- **GET** [Base_URL]/Encounter/[id]
- **GET** [Base_URL]/Encounter?patient=[reference]
- **GET** [Base_URL]/Encounter?date={gt|lt|ge|le}[date]&date={gt|lt|ge|le}[date]&...&patient=[reference]
- **GET** [Base_URL]/Encounter?identifier={system}|[code]
- **GET** [Base_URL]/Encounter?class={system}|[code]&patient=[reference]
- **GET** [Base_URL]/Encounter?patient=[reference]&type={system}|[code]

- **GET** [Base_URL]/Encounter?patient=[reference]&status={system|}[code]

5.7.1.2 Example Request:

- **GET** [Base_URL]/Encounter/1104}

5.8 USCDI: Goals

Components:

- Patient Goals
- SDOH Goals

5.8.1 FHIR Resource: Goal

US Core Implementation Guide: [Goal Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: identifier [token], patient [reference], subject [reference], category [token], lifecycle-status [token], start-date [date], target-date [date]

5.8.1.1 Syntax:

- **GET** [Base_URL]/Goal/[id]
- **GET** [Base_URL]/Goal?patient=[id]
- **POST** [Base_URL]/Goal/_search (parameters are x-www-form-urlencoded)

5.8.1.2 Example Request:

- **GET** [Base_URL]/Goal?patient=100000026

5.9 USCDI: Health Insurance Information

Components:

- Coverage Status
- Coverage Type
- Relationship to Subscriber
- Member Identifier
- Subscriber Identifier
- Group Number
- Payer Identifier

5.9.1 FHIR Resource: Coverage

US Core Implementation Guide: [Coverage Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: identifier [token], patient [reference]

5.9.1.1 Syntax:

- GET [Base_URL]/Coverage/[id]
- GET [Base_URL]/Coverage?patient=[id]
- POST [Base_URL]/Coverage/_search (parameters are x-www-form-urlencoded)

5.9.1.2 Example Request:

- GET [Base_URL]/Coverage?patient=100000026

5.10 USCDI: Health Status/Assessments

Components:

- Health Concerns
- Functional Status
- Disability Status
- Smoking Status
- Mental/Cognitive Status
- Pregnancy Status

5.10.1 FHIR Resource: Observation

US Core Implementation Guide: [Assessment Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: patient [reference], category [token], date [date], status [token], code [token]

5.10.1.1 Syntax:

- GET [Base_URL]/Observation?patient=[id]&category=social-history&date=geYYYY-MM-DD&date=leYYYY-MM-DD

5.10.1.2 Example Request:

- **GET** [Base_URL]/Observation?patient=100000026&category=social-history

5.11 USCDI: Immunizations

Components:

- Immunizations

5.11.1 FHIR Resource: Immunization

US Core Implementation Guide: [Immunization Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: identifier [token], patient [reference], performer [reference], status [token], date [date], vaccine-code [token]

5.11.1.1 Syntax:

- **GET** [Base_URL]/Immunization/[id]
- **GET** [Base_URL]/Immunization?patient=[id]&date=geYYYY-MM-DD&date=leYYYY-MM-DD
- **POST** [Base_URL]/Immunization/_search (parameters are x-www-form-urlencoded)

5.11.1.2 Example Request:

- **GET** [Base_URL]Immunization?patient=100000026

5.12 USCDI: Laboratory

Components:

- Tests
- Values/Results
- Specimen Type
- Result Status

5.12.1 FHIR Resource: Observation

US Core Implementation Guide: [Laboratory Result Observation Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: identifier [token], patient [reference], subject [reference], performer [reference], status [token], code [token], date [date], category [token]

5.12.1.1 Syntax:

- **GET** [Base_URL]/Observation/[id]
- **GET** [Base_URL]/Observation?category={http://terminology.hl7.org/CodeSystem/observation-category}|laboratory
- **GET** [Base_URL]/Observation?patient=[id]&category={http://terminology.hl7.org/CodeSystem/observation-category}|laboratory&code={system}|[code]
- **GET** [Base_URL]/Observation?patient=[id]&category={http://terminology.hl7.org/CodeSystem/observation-category}|laboratory&date=geYYYY-MM-DD&date=leYYYY-MM-DD
- **POST** [Base_URL]/Observation/_search (parameters are x-www-form-urlencoded)

5.12.1.2 Example Request:

- **GET**
[Base_URL]/Observation?patient=100000026&category=laboratory&code=577 8-6

5.12.2 FHIR Resource: DiagnosticReport

US Core Implementation Guide: [Profile for Laboratory Results Reporting](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: patient [reference], status [token], code [token], date [date], category [token]

5.12.2.1 Syntax:

- **GET** [Base_URL]/DiagnosticReport?category={http://terminology.hl7.org/CodeSystem/v2-0074|LAB
- **GET** [Base_URL]/DiagnosticReport?category={http://terminology.hl7.org/CodeSystem/v2-0074|LAB&patient=[id]

- **GET** [Base_URL]/DiagnosticReport?category=http://terminology.hl7.org/CodeSystem/v2-0074|LAB&patient=[id]&code={system|}[code]
- **GET** [Base_URL]/DiagnosticReport?category=http://terminology.hl7.org/CodeSystem/v2-0074|LAB&patient=[id]&date=geYYYY-MM-DD&date=leYYYY-MM-DD
- **POST** [Base_URL]/DiagnosticReport/_search (parameters are x-www-form-urlencoded)

5.12.2.2 Example Request:

- **GET** [Base_URL]/DiagnosticReport?category=http://terminology.hl7.org/CodeSystem/v2-0074|LAB&patient=100000026

5.13 USCDI: Medications

Components:

- Medications
- Dose
- Dose Unit of Measure
- Indication
- Fill Status

5.13.1 FHIR Resource: MedicationRequest

US Core Implementation Guide: [MedicationRequest Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: status [token], intent [token], patient [reference], encounter [reference], authoredon [date]

5.13.1.1 Syntax:

- **GET** [Base_URL]/MedicationRequest?patient=[id]&intent={system|}[code]
- **GET** [Base_URL]/MedicationRequest?patient=[id]&intent=order&status={system|}[code]
- **POST** [Base_URL]/MedicationRequest/_search (parameters are x-www-form-urlencoded)

5.13.1.2 Example Request:

- **GET** [Base_URL]/MedicationRequest?patient=100000139&intent=order}

5.14 USCDI: Patient

Components:

- First Name
- Last Name
- Middle Name (Including middle initial)
- Name Suffix
- Previous Name
- Date of Birth
- Date of Death
- Race
- Ethnicity
- Tribal Affiliation
- Sex
- Preferred Language
- Current Address
- Previous Address
- Phone Number
- Phone Number Type
- Email Address
- Related Person's Name
- Related Person's Relationship
- Occupation
- Occupation Industry

5.14.1 FHIR Resource: Patient

US Core Implementation Guide: [Patient Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: _id [token], identifier [token], birthdate [date], gender [token], family [token], given [string], name [string], us-core-race [token], us-core-ethnicity [token]

5.14.1.1 Syntax:

- **GET** [Base_URL]/Patient/_search?patient=[id]

- **GET** [Base_URL]/Patient/[id]
- **GET** [Base_URL]/Patient?identifier={system|}[code]
- **GET** [Base_URL]/Patient?name=[string]
- **GET** [Base_URL]/Patient?family=[string]
- **GET** [Base_URL]/Patient?given=[string]
- **GET** [Base_URL]/Patient?us-core-race=[string]
- **GET** [Base_URL]/Patient?us-core-ethnicity=[string]
- **GET** [Base_URL]/Patient?birthdate=[date]&name=[string]
- **GET** [Base_URL]/Patient?gender={system|}[code]&name=[string]
- **POST** [Base_URL]/Patient/_search (parameters are x-www-form-urlencoded)

5.14.1.2 Example Request:

- **GET** [Base_URL]/Patient?family=DOE}

5.15 USCDI: Problems

Components:

- Problems
- SDOH Problems/Health Concerns
- Date of Diagnosis
- Date of Resolution

5.15.1 FHIR Resource: Condition

US Core Implementation Guide: [Condition Problems and Health Concerns Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: patient [reference], subject [reference], category [token], clinical-status [token], code [token], onset-date [date], abatement-date [date], asserted-date [date], encounter [reference], recorded-date [date]

5.15.1.1 Syntax:

- **GET** [Base_URL]/Condition/[id]
- **GET** [Base_URL]/Condition?patient=[id]

- **GET** [Base_URL]/Condition?subject=[id]
- **GET** [Base_URL]/Condition?category=[code]
- **GET** [Base_URL]/Condition?clinical-status=[code]
- **GET** [Base_URL]/Condition?code=[code]
- **GET** [Base_URL]/Condition?onset-date=[date]&abatement-date=[date]
- **POST** [Base_URL]/Condition/_search (parameters are x-www-form-urlencoded)

5.15.1.2 Example Request:

- **GET** [Base_URL]/Condition?patient=100000026}

5.16 USCDI: Procedures

Components:

- Procedures
- SDOH Interventions
- Reason for Referral

5.16.1 FHIR Resource: Procedure

US Core Implementation Guide: [Procedure Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: identifier [token], patient [reference], subject [reference], performer [reference], status [token], code [token], date [date]

5.16.1.1 Syntax:

- **GET** [Base_URL]/Procedure/[id]
- **GET** [Base_URL]/Procedure?identifier=[id]
- **GET** [Base_URL]/Procedure?patient=[id]
- **GET** [Base_URL]/Procedure?subject=[id]
- **GET** [Base_URL]/Procedure?performer=[id]
- **GET** [Base_URL]/Procedure?status=[code]
- **GET** [Base_URL]/Procedure?code=[code]

- **GET** [Base_URL]/Procedure?date=[date]
- **POST** [Base_URL]/Procedure/_search (parameters are x-www-form-urlencoded)

5.16.1.2 Example Request:

- **GET** [Base_URL]/Procedure?patient=100000026

5.17 USCDI: Provenance

Components:

- Author Organization
- Author Time Stamp

5.17.1 FHIR Resource: Provenance

US Core Implementation Guide: [Provenance Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Provenance resources only exist in the context of their association of other FHIR resources. Provenance reports on chain of custody of a piece of information.

5.17.1.1 Syntax:

- **GET** [Base_URL]/[Resource]?patient=[id]&_revinclude=Provenance:target
- **POST** [Base_URL]/[Resource]/_search (parameters are x-www-form-urlencoded)

5.17.1.2 Example Request:

- **GET**
[Base_URL]/Observation?patient=100000026&_revinclude=Provenance:target

5.18 USCDI: Unique Device Identifier(s) for a Patient's Implantable Device(s)

Components:

- Unique Device Identifier(s) for a patient's implantable device(s)

5.18.1 FHIR Resource: Device

US Core Implementation Guide: [Implantable Device Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: patient [reference], type [token], status [token]

5.18.1.1 Syntax:

- GET [Base_URL]/Device?patient=[id]
- GET [Base_URL]/Device?patient=[id] &type={system|}[code]
- GET [Base_URL]/Device?patient=[id]&status={system|}[code]{,{system|}[code],...}
- POST [Base_URL]/Device/_search (parameters are x-www-form-urlencoded)

5.18.1.2 Example Request:

- GET [Base_URL]/Device?patient=100000026

5.19 USCDI: Vital Signs

Components:

- Systolic Blood Pressure
- Diastolic Blood Pressure
- Heart Rate
- Respiratory Rate
- Body Temperature
- Body Height
- Body Weight
- Pulse Oximetry
- Inhaled Oxygen Concentration
- BMI Percentile (2 - 20 years)
- Weight-for-length Percentile (Birth - 24 Months) \
- Head Occipital-frontal Circumference Percentile (Birth- 36 Months)

5.19.1 FHIR Resource: Observation

US Core Implementation Guide: [Vital Signs Profile](#)

The [Base_URL] is listed in Table 3-1.

Search Expression: SearchType

Parameters: patient [reference], category [token], date [date], status [token], code [token]

5.19.1.1 Syntax:

- **GET** [Base_URL]/Observation?patient=[id]&category=social-history&date=geYYYY-MM-DD&date=leYYYY-MM-DD

5.19.1.2 Example Request:

- **GET** [Base_URL]/Observation?patient=100000026&category=http://terminology.hl7.org/CodeSystem/observation-category|vital-signs

6.0 Supported Types and API Parameters

6.1 Supported and Unsupported Types

Supported request type:

- HTTP GET
- HTTP POST

Unsupported request types:

- HTTP DELETE
- HTTP PUT

7.0 Responses

As shown in each resource example in Table 7-1, the 4DH FHIR API is capable of providing the responses in both JSON & XML formats.

Table 7-1: 4DH Response Format

Resource	Response Format
Application/JSON	https://ihs4dhapim.ihs.gov/FHIR/r4/Condition/_search?patient=tokenID&_format=JSON
Application/XML	https://ihs4dhapim.ihs.gov/FHIR/r4/Condition/_search?patient=tokenID&_format=XML

8.0 Error Codes/Handling

The 4DH FHIR Server handles errors and has exceptions that provide an HTTP status code and a message in both JSON and XML formats and are listed in Table 8-1.

Table 8-1: HTTP Status Codes

Response	HTTP Status Code	Description
OK	200	valid request
OK	202	request is accepted
Bad Request	400	invalid or a bad URL request is made to the server
Forbidden Request	403	The request is not allowable with the current permissions. An example is a user trying to access data for which they do not have permissions.
Data Not Found	404	invalid or a bad URL request is made to the server

9.0 Bulk Export

The 4DH FHIR API allows bulk data exports from the 4DH repository.

To gain access, the client creates a JSON Web Token (JWT) to authenticate with the authorization server. After authentication, an access token is provided to use in the API requests.

The 4DH Bulk Export FHIR API supports:

- HTTP GET
- HTTP DELETE

The JWT authorization request requires the claims listed in Table 9-1 in addition to the client's signed private key.

Table 9-1: Required JWT Claims

JWT Claim	Description
iss	Client's client_id
sub	Service's client_id
aud	Authorization server's token URL
exp	Expiration time integer for the authentication JWT, expressed in seconds since the "Epoch" (1970-01-01T00:00:00Z UTC). This time SHALL be no more than five minutes in the future.
jti	A nonce string value that uniquely identifies this authentication JWT.

The authorization request response body contains required information encoded in JSON, as listed in Table 9-2.

Table 9-2 Required Information

Token Property	Description
access_token	Access token issued by authorization server
token_type	Fixed value: bearer
expires_in	The lifetime in seconds of the access token. Since the token is set at 5 minutes, the recommended value is 300.
scope	Scope of access authorized

9.1 Bulk FHIR Dataset Query (with access token)

The bulk dataset query requires specific methods and resources, as shown in Table 9-3.

Table 9-3: Bulk FHIR Dataset Query

Method	Description
GET [fhir base]/Patient/\$export	Data on all patients
GET [fhir base]/Group/[id]/\$export	Data on all patients within a group
GET [fhir base]/\$export	All data in the system e.g. EHR migration

9.2 URL to Poll for Completion Status

With a valid and authorized query request, the 4DH system can begin to collect the data specified in the request. The final results will be made available in output files, which the client will likely need to download.

In the response to the data client, the 4DH system will provide a URL where the client can issue calls to check on the status of (or cancel) the Bulk FHIR Data query processing.

While the background job is in progress, requests for status should return a status of either a 202 (still in progress) or 200 (complete). The URL to poll for status, as well as the URL to cancel, is listed in Table 9-4.

Table 9-4: URLs for Status and Cancellation

Action	URL	Notes
Status Request	GET https://ihsdev4dhapim.ihs.gov/bulkfhir/r4/status/93c67743-540c-4783-b07c-05c460279f9e	The data client can begin checking whether or not the requested files are ready for download. May repeat request. Responses: X-Progress: "50% complete", Retry-After: 120, or a file list
Cancel request	DELETE https://ihsdev4dhapim.ihs.gov/bulkfhir/r4/status/93c67743-540c-4783-b07c-05c460279f9e	At the data client's discretion, the client can call the status url. If the cancellation request is processed successfully, 4DH ODS will respond with a Status of 202

9.3 FHIR Data File Download

A final status check will return the location of the generated data files. A 4DH sample response with the location of the files is shown below.

9.4 FHIR Data Format

The files at the locations listed in the Sample 4DH Completion Response are of type ndjson, which is a list of json objects separated by a newline character. Each file contains one FHIR resource per line. Sample contents of a file are shown below.

9.4.1 Sample FHIR data file

```
Line 1: {"id":"5c41cecf-cf81-434f-9da7-e24e5a99dbc2","name":[{"given":["Brenda"],"family":["Jackson"]}],"gender":"female","birthDate":"1956-10-14T00:00:00.000Z","resourceType":"Patient"}
Line 2: {"id":"3fabcb98-0995-447d-a03f-314d202b32f4","name":[{"given":["Bram"],"family":["Sandeep"]}],"gender":"male","birthDate":"1994-11-01T00:00:00.000Z","resourceType":"Patient"}
Line 3: {"id":"945e5c7f-504b-43bd-9562-a2ef82c244b2","name":[{"given":["Sandy"],"family":["Hamlin"]}],"gender":"female","birthDate":"1988-01-24T00:00:00"}
FHIR is the registered trademark of Health Level Seven International (HL7) and is used with the permission of HL7.
```

Figure 9-1: Sample FHIR data file

10.0 Revoking Third-Party App Access

This section is intended for patients who will access the IHS 4DH FHIR API through third-party applications on their mobile phones or tablets. While this document primarily targets third-party developers integrating with the FHIR API, we are including patient-facing guidance here as a placeholder to support future integration efforts.

Per the ASTP/ONC Health IT Certification requirements, implementers of the (g)(10) Standardized API for Patient and Population Services must provide patients with the ability to revoke access previously granted to third-party applications.

To meet this requirement, IHS offers a mobile-friendly application that allows patients to:

- View which third-party apps currently have access to their health data
- Revoke access by invalidating the associated authorization tokens

Patients can access this functionality through the following link:

<https://ihs4dhapim.ihs.gov/data-control/>

While IHS staff will interact with patients during the registration process to establish their access to the 4DH FHIR API, third-party application developers are responsible for ensuring that patients receive clear information on how to manage and revoke access to their health data. IHS will coordinate with each developer during the integration process to verify that appropriate patient-facing guidance is included in their applications in alignment with ONC Health IT Certification requirements.

A separate registration guide will be provided for IHS staff to support patient onboarding at the facility level.

10.1 Token Revocation Workflow

1. Upon accessing the token revocation application, patients will be prompted to login using their credentials. These are the same credentials used previously to authorize third-party application's access to their health data (Figure 10-1).

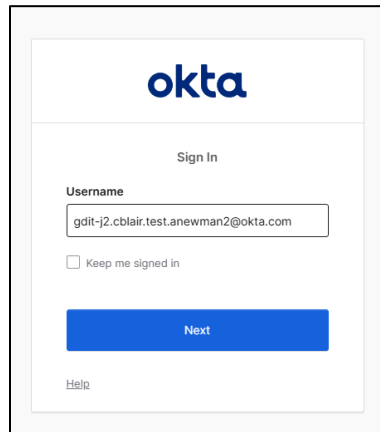


Figure 10-1: Okta sign in

2. After successfully logging in, patients will see a list of third-party applications that currently have access to their data. To revoke access, click the “Revoke” button next to the desired application (Figure 10-2). If multiple tokens exist for an application, they are grouped together, and revoking access will disable all associated tokens for that application. This action immediately disables the application’s ability to access the patient’s data using the existing access token. If desired, the patient can reauthorize the application later through the application’s original access process.

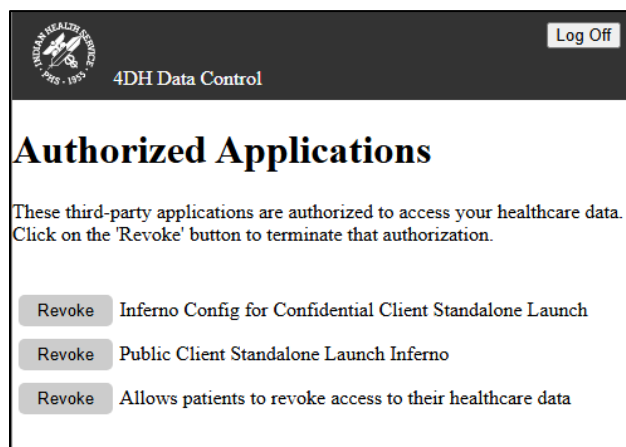


Figure 10-2: 4DH Data Control

3. Click **Log Off** to securely end the session.

Acronym List

Acronym	Meaning
4DH	Four Directions Hub (HIE service)
ASTP	Assistant Secretary for Technology Policy
API	Application Programming Interface
CCDA	Consolidated Clinical Document Architecture
CIS	Centralized Interoperability Suite
EHR	Electronic Health Record
FHIR	Fast Healthcare Interoperability Resources
HL7	Health Level Seven International
IHS	Indian Health Service
JSON	JavaScript Object Notation
JWT	JSON Web Token
ONC	Office of National Coordinator
RPMS	Resource and Patient Management System
XML	Extensible Markup Language

Contact Information

If you have any questions or comments regarding this distribution, please contact the IHS IT Service Desk.

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