



Version: V6.1

API DOCUMENTATION FOR EXTERNAL APPLICATION ACCESS

This document describes the API details for §170.315(g)(10) Standardized API for Patient and Population Services

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1. General Concepts

a. Application Access Requests

The API is a read-only RESTful HL7 FHIR® R4 API and follows the syntax described at <https://hl7.org/fhir/R4/http.html>.

All RESTful data access requests will be in the following format, in which the [base] URL will need to be obtained from the Data Holder, either directly or via directory information:

```
GET [base]/[resource-specific parameters]...
```

FHIR Bulk Data Access Group export is also supported as described in the Bulk Data Access IG.

b. Connecting to the server

The server is accessed by clients through an https connection.

Important: Local security policies must be in place to prevent unauthorized monitoring or eavesdropping of connections to the server.

Important: Only TLS 1.2 connections are accepted. All plaintext connections will be refused.

Note: Please limit your connection frequency to a value appropriate for your use case. Connection attempts which are more frequent than permitted by the bandwidth allocation for the data resource are not allowed.

c. Authentication – Obtaining an Access Token

Prior to making API requests, the client application must obtain an Access Token. The client software must support client credentials grant flow as detailed in [RFC 6749](#).

For client applications using authorization code grants, end user authentication is performed using a username and authentication credentials provided by the Data Holder.

Note: Usernames and authentication credentials are established and reset by Acurus.

When an end user is directed to the authorization endpoint, and if the correct credentials are supplied, Capella EHR grants access to the client application, an authorization code will be returned to the client that the client application can use to obtain an access token through the token endpoint as described in RFC 6749. For client credentials flow, the application obtains an access token directly from the token endpoint without user interaction.

Each client can connect with a base URL provided by Acurus. The required endpoint URLs are of the following form:

No clients are using the API yet, so there are no service base URLs and the service base URLs will be included here when clients begin using the API.

ENDPOINT	URL
Authorization	https://sandbox-r4.interopengine.com/fhir/r4/acurus/authz
Token	https://sandbox-r4.interopengine.com/fhir/r4/acurus/token
Registration	https://sandbox-r4.interopengine.com/fhir/r4/acurus/register
Manage	https://sandbox-r4.interopengine.com/fhir/r4/acurus/manage
Revoke	https://sandbox-r4.interopengine.com/fhir/r4/acurus/revoke

Refresh tokens: Note that refresh tokens are not issued to Client apps that support client credentials code flow as these clients can authenticate directly to the token endpoint to obtain a new access token.

2. API Details

a. Query a Specific Data Category Resource

Client software must be capable of making HTTPS RESTful requests in accordance with the FHIR specification and consuming the FHIR Resources required by the United States Core Data for Interoperability ([USCDI](#)) or the FHIR [Bulk Data Access specification](#).

Resources returned conform to the resource profiles for HL7 FHIR R4 defined in the HL7 FHIR US Core Implementation Guide Release 3.1.1 found at <https://hl7.org/fhir/us/core/STU3.1.1>. All of the US Core Resource Profiles are supported except the optional US Core Medication Profile, as this API uses inline medication codes to represent medications instead of References to separate Medication resources.

General specifications for FHIR resources and the associated data elements can be found at <https://hl7.org/fhir/R4/resourcelist.html> for other resource types without a US Core profile.

Additional information for each required FHIR Resource or Data Element used to represent each data category can be found at the page above. For example, the Patient.name element is found at: <https://hl7.org/fhir/R4/patient-definitions.html#Patient.name>. The US Core FHIR IG profiles found at <https://hl7.org/fhir/us/core/STU3.1.1/profiles.html> provide additional information on the meanings of elements and codes used by these profiles.

Choices of data types: The US Core resource profiles permit a number of data types for certain resource elements as indicated by the [x] notation in the corresponding element names. The following table lists the data types supported for elements where a choice of data types is allowed by the US

Core FHIR IG. However, please note that a particular Data Holder may not return all supported data types for a given element.

RESOURCE DATA ELEMENT	SUPPORTED CHOICES
AllergyIntolerance.onset[x]	dateTime, Age, Period, Range, string
CarePlan.scheduled[x]	Timing, Period, string
CarePlan.product[x]	CodeableConcept, Reference
Condition.onset[x]	dateTime, Age, Period, Range, string
Condition.abatement[x]	dateTime, Age, Period, Range, string
DiagnosticReport.effective[x]	dateTime, Period
Goal.start[x]	date, CodeableConcept
Goal.detail[x]	Quantity, Range, CodeableConcept, string, boolean, integer, Ratio
Goal.due[x]	date
Immunization.occurrence[x]	dateTime, string
Immunization.doseNumber[x]	positiveInt, string
Immunization.seriesDoses[x]	positiveInt, string
MedicationRequest.reported[x]	boolean, Reference
MedicationRequest.medication[x]	CodeableConcept
MedicationRequest.doseageInstruction.asNeeded[x]	boolean, CodeableConcept
MedicationRequest.doseageInstruction.doseAndRate.dose[x]	Range, SimpleQuantity

RESOURCE DATA ELEMENT	SUPPORTED CHOICES
MedicationRequest.doseageInstruction.doseAndRate.rate[x]	Ratio, Range, SimpleQuantity
MedicationRequest.doseageInstruction.substitution.allowed[x]	boolean, CodeableConcept
Observation.effective[x]	dateTime, Period
Observation.value[x]	Quantity, CodeableConcept, string, boolean, integer, Range, Ratio, SampleData, time, dateTime, Period
Observation.component.value[x]	Quantity, CodeableConcept, string, boolean, integer, Range, Ratio, SampleData, time, dateTime, Period
Patient.deceased[x]	boolean, dateTime
Patient.multipleBirth[x]	boolean, integer
PractitionerRole.performed[x]	dateTime, Period
Provenance.occurred[x]	dateTime, Period

Choices of Reference resource types: The US Core resource profiles and the inherited FHIR R4 Observation Vital Signs profile permit a number of resource types to be referenced for certain "Must Support" resource elements where a value of type Reference is allowed for the corresponding element. The following table lists the resource types supported for such elements where a choice of referenced resource types is allowed. However, please note that a particular Data Holder may not return all supported resource types for a given element.

RESOURCE DATA ELEMENT	SUPPORTED CHOICES
CareTeam.participant.member	US Core Patient, US Core Practitioner, US Core Organization
DiagnosticReport.performer	US Core Practitioner, US Core Organization
DocumentReference.author	US Core Practitioner, US Core Organization, US Core Patient

RESOURCE DATA ELEMENT	SUPPORTED CHOICES
MedicationRequest.reportedReference	US Core Patient, US Core Practitioner, US Core Organization
MedicationRequest.requester	US Core Practitioner, US Core Organization, US Core Patient
Observation.hasMember	FHIR R4 Observation Vital Signs
Provenance.agent.who	US Core Practitioner, US Core Patient, US Core Organization

b. Patient Selection

To search for patients, the application should request a bundle of Patient resources matching suitable search criteria. To facilitate this, client apps may include the following optional search parameters in a request for a Patient resource:

RESOURCE DATA ELEMENT	SEARCH PARAMETER
Patient.identifier	identifier
Patient.name	name
Patient.gender	gender
Patient.birthDate	birthdate

Please see the sections relating to search parameters in the [US Core Patient Profile](#) for details. Contact Acurus for more information on the supported search parameters or review the capability statement.

For example, to retrieve a bundle of Patient resources to which the app is authorized, where the patient's first or last name is Smith and the patient was born on July 4, 1976, the request could be formatted as:

<https://sandbox-r4.interopengine.com/fhir/r4/acurus/Patient?name=Smith&birthdate=1976-07-04>

The API will return a bundle of all patients (possibly zero) matching the search criteria. Only patients for which the app has been authorized access will be included in the results. Each patient returned in the search results is assigned a unique patient ID that can be found in the Patient.id element of the corresponding Patient resource. This patient ID can be included in subsequent requests to retrieve additional resources for that specific patient.

c. Query for a Specific Data Category

The Patient resource can be retrieved by specifying a specific patient ID or by performing a search as discussed in section 3(b). The remaining resource types listed in Section 3(a) can be accessed for a specific patient as a Bundle of resources by performing a search by resource type or by patient compartment and specifying the patient ID in the request. For example, to retrieve a bundle of Immunization resources containing all available immunization history for Patient 1234, the request could be formatted as:

```
https://sandbox-r4.interopengine.com/fhir/r4/acurus/Immunization?patient=1234
```

The following search terms can be used to isolate results for a single USCDI data class in cases where two or more data classes are represented by a single FHIR resource type:

USCDI DATA CLASS	SEARCH PARAMETER
Health Concerns	category=http://hl7.org/fhir/us/core/CodeSystem/condition-category health-concern
Problems	category=http://terminology.hl7.org/CodeSystem/condition-category problem-list-item
Smoking Status	code=http://loinc.org 72166-2
Vital Signs	category=http://terminology.hl7.org/CodeSystem/observation-category vital-signs
Laboratory Tests & Laboratory Values/Results	category=http://terminology.hl7.org/CodeSystem/observation-category laboratory

For example, to retrieve the Smoking Status for Patient 1234, the request could be formatted as:

```
https://sandbox-r4.interopengine.com/fhir/r4/acurus/Patient/1234/Observation?code=http://loinc.org|72166-2
```

Each search request will return a bundle of zero or more results meeting the search criteria.

d. Query for All Data as a CCDAs document

CCDA documents can be accessed within DocumentReference resources using the \$docref operation as described in the US Core FHIR IG at: <https://hl7.org/fhir/us/core/STU3.1.1/OperationDefinition-docref.html>. CCDAs are categorized as “Summary of Episode” Notes with LOINC code 34133-9. For example, to request a CCDAs document covering all dates for patient 1234, the query could be formatted as:

```
https://sandbox-r4.interopengine.com/fhir/r4/acurus/DocumentReference/$docref?patient=1234
```


The Base64 encoded CCDA XML data can be found in the DocumentReference.content.attachment.data element of the returned DocumentReference resource within the returned Bundle, if any.

e. Query for a Subset of Data using Search Parameters

The USCDI data classes or CCDA documents returned by the API may be filtered by supplying one or more optional search parameters, as detailed in the search parameter sections of the [US Core Profiles](#) for the corresponding resource type. The following table lists the supported search parameters for this purpose:

RESOURCE DATA ELEMENT	SEARCH PARAMETER
CarePlan.category	category
CareTeam.status	status
DiagnosticReport.code	code
DiagnosticReport.category	category
DiagnosticReport.effective	date
DocumentReference.type	type
DocumentReference.category	category
DocumentReference.date	date
Condition.category	category
MedicationStatement.status	status
MedicationRequest.intent	intent
Observation.code	code
Observation.category	category
Observation.effective	date
Patient.identifier	identifier

RESOURCE DATA ELEMENT	SEARCH PARAMETER
Patient.name	name
Patient.gender	gender
Patient.birthDate	birthdate
Condition.category	category
Procedure.performed	date

Contact Acurus for more information on the supported search parameters or review the capability statement.

f. Error Handling

If the access token used in the request is invalid, expired, or the user has not been authorized to access the requested Resource, the API will return a 401 Unauthorized or 403 Forbidden HTTP response.

If the request cannot be processed for other reasons (temporarily unavailable, unsupported resource type, system error, etc.), the API will return a 400 Bad Request HTTP response containing an OperationOutcome Resource with additional information regarding the issue contained in the OperationOutcome.issue element.

Handling of OAuth-related errors is detailed in [RFC 6749](#).

Handling of dynamic client registration errors is detailed in [RFC 7591](#).

g. Supported clinical scopes

Apps identify the types of clinical data they would like to access by specifying one or more clinical OAuth scopes in their registration and authorization requests. Clinical scopes follow the format defined in the SMART App Launch Framework 1.0.0. Please see <https://www.hl7.org/fhir/smart-app-launch/1.0.0/scopes-and-launch-context/index.html#scopes-for-requesting-clinical-data> for additional details. Only read scopes are supported. Write scopes will be rejected. Applications may request patient-level, user-level, or system-level scopes for the following resource types:

RESOURCE
AllergyIntolerance
CarePlan
CareTeam

RESOURCE
Condition
Device
DiagnosticReport
DocumentReference
Encounter
Goal
Group
Immunization
Location
MedicationRequest
Observation
Organization
Patient
Practitioner
PractitionerRole
Procedure
Provenance

Some Data Holders may support additional resource types and clinical scopes. Contact Acurus for more information on the supported scopes or review the endpoint's capability statement to identify other resource types supported by that endpoint.

Applications may also request "wildcard" scopes, e.g.: user/*.read

h. OpenID Connect

For client apps that need to authenticate the end user using OpenID Connect, the server supports the required OpenID Connect functionality as specified in the SMART App Launch Framework version 1.0.0. Please refer to the following link for details: <https://www.hl7.org/fhir/smart-app-launch/1.0.0/scopes-and-launch-context/index.html#scopes-for-requesting-identity-data>

i. Other Security Considerations

Revoking access to patient data: End users can sign in to the management endpoint listed above to terminate access that the user has previously granted to a client application. Client applications may request revocation of tokens by making a request to Acurus' revocation endpoint as described in [RFC 7009](#).

j. Attributes required for registration

To register a client for authorization code flow, the following information is required:

Developer Name	the name of the entity that created the app
Developer Representative	the name of the person completing this registration
Client App Name	the human-readable name of the app
Redirect URI	the app's redirection URI (https only)
Client App URI (optional)	a web page about the client app (http or https)
Logo URI (optional)	a URI to retrieve an image file with the app's logo (https only)
Terms of Service URI (optional)	a web page to view the app's terms of service (http or https)
Privacy Policy URI (optional)	a web page to view the app's privacy policy (http or https)
Contact email	an email address where the app developer may be contacted (use mailto: scheme)

Additionally, the client app developer will select the applicable characteristics of their application from the following:

The client application is a confidential client capable of storing a client secret.

The client application is a native application capable of securing a refresh token.

Please see Section 2.1 of [RFC 6749](#) for the definitions of 'confidential' and 'native application' as used above.