

The PARADIGM® FHIR API provides thorough REST-based interoperability of patient health information to developers and software using the HL7® FHIR® standard and the U.S. Core Data for Interoperability (USCDI) data classes and data elements.

This document provides guidance on the usage of the PARADIGM® FHIR API.

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Authentication

Authorization and access to the API is authenticated used OAuth 2.0 protocols. Registered end-users can request an authorization grant and exchange the granted code for an access token. Proof Key for Code Exchange (PKCE) is required to obtain granted authorization codes and access tokens. For more information on PKCE please refer to [IETF RFC 7636](#).

Registration

Third parties and end-users may only register for Developer accounts through the client/practice they represent. See Terms and Conditions for more information.

Authorization Grant

Registered end-users can request an authorization grant using the following request.

Request: GET <https://api.qrshs.com/fhir/authorize>

❖ Request Parameters

Name	Type	Required	Description
response_type	string	required	Fixed value: 'code'
client_id	string	required	Registered Client ID
state	string	required	Value used to maintain state between request and response
redirect_uri	string	required	Must match a pre-registered URI established during registration
scope	string	required	Level of access being requested in a comma separated list
aud	string	required	URL of the resource server being requested
code_challenge	string	required	Parameter generated by application for PKCE code challenge
code_challenge_method	string	required	Fixed value: 'S256'

Response Parameters:

Name	Type	Description
code	string	Granted authorization code
state	string	Exact value sent in the authorization request

Available Scopes: All patient scopes have read and search available (.rs)

openid	patient/Encounter.rs	patient/Organization.rs
patient/Medication.rs	patient/Goal.rs	patient/Patient.rs
patient/AllergyIntolerance.rs	patient/Immunization.rs	patient/Practitioner.rs
patient/CarePlan.rs	patient/Location.rs	patient/Procedure.rs
patient/CareTeam.rs	patient/MedicationRequest.rs	patient/Provenance.rs
patient/DiagnosticReport.rs	patient/Observation.rs	patient/PractitionerRole.rs
patient/DocumentReference.rs	patient/Encounter.rs	patient/Organization.rs

Access Token

Using granted authorization code, it may be exchanged for an access token with the following request.

Request: POST <https://api.qrshs.com/fhir/token>

❖ Request Headers

Name	Type	Required	Description
Authorization	Basic	required	Using given client ID and client secret

❖ Request Parameters

Name	Type	Required	Description
grant_type	string	required	Fixed value: 'authorization_code'
code	string	required	Granted authorization code
redirect_uri	string	required	Must match a pre-registered URI established during registration
code_verifier	string	required	Used to verify against the code_challenge from authorization

Response Parameters:

Name	Type	Description
token_type	string	Fixed value: 'Bearer'
access_token	string	Issued access token
expires_in	integer	Lifetime of the token in seconds
scope	string	Authorized scope of access
refresh_token	string	Token that can be used to refresh access under the original grant

Refresh Token

Sending the refresh_token to the same endpoint will issue a new token under the original grant request.

Request: POST <https://api.qrshs.com/fhir/token>

❖ Request Headers

Name	Type	Required	Description
Authorization	Basic	required	Using given client ID and client secret

❖ Request Parameters

Name	Type	Required	Description
grant_type	string	required	Fixed value: 'refresh_token'
refresh_token	string	required	Refresh token from the previous access token request

Response Parameters:

Same parameters as Access Token returns.

Request Structure

The basic request structure is formatted as the following:

Request: GET [base]/[resource]/[parameters]

- ❖ The base is the API URL **https://api.qrshs.com/fhir**
- ❖ The resource is the FHIR resource name, such as Patient or Observation
- ❖ The parameters are the id and search criteria, such as id=04222022 or name=Barbara
- ❖ **Request Headers**

Name	Type	Required	Description
Authorization	Bearer	required	Access token from authentication

Interactions are limited to Read (GET) access only. Available FHIR resources and their formats are listed below. For more information on FHIR and it's intended request structure, please visit <http://hl7.org/fhir/http.html>.

FHIR Resources

Patient

Query Patient for a patient selection and demographic information. For more information on this resource please refer to the [US Core Patient Profile](#).

Request: GET [base]/Patient{parameters}

- ❖ **Example:** https://api.qrshs.com/fhir/Patient?id=10006
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
identifier	string	conditional	Unique MRN
name	string	optional	Patient's name
birthdate	date	option	Patient's date of birth
gender	string	optional	Administrative gender

Response Parameters:

Name	Type	Example
id	string	"10006-111-20180823"
identifier	array	[{ "type": { "text": "Medical Record Number", "coding": [{ "code": "MR", "system": "http://terminology.hl7.org/CodeSystem/v2-0203", "display": "Medical Record Number" }] }, "system": "https://cert.qrshs.com", "value": "10006" }, { "type": { "text": "Social Security Number", "coding": [{ "code": "SS", "system": "http://terminology.hl7.org/CodeSystem/v2-0203", "display": "Social Security Number" }] }, "system": "https://cert.qrshs.com", "value": "666-66-6666" }]
name	array	[{ "use": "usual", "suffix": ["Jr."], "family": "Mouse", "text": "Grey Mouse", "given": ["Grey"], "period": { "start": "1986-06-06T00:00:10-05:00", "end": "2022-11-17T09:24:14Z" }, "prefix": ["Mr."] }]

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telecom	array	[<pre> { "use": "home", "system": "phone", "value": "(501) 501-5555" }, { "use": "work", "system": "phone", "value": "(501) 501-5557" }] </pre>
gender	string	"male"
birthDate	date	"1986-06-06"
extension	array	[<pre> { "url": "http://hl7.org/fhir/us/core/StructureDefinition/us-core-race", "extension": [{ "url": "ombCategory", "valueCoding": { "code": "2106-3", "system": "urn:oid:2.16.840.1.113883.6.238", "display": "White" } }, { "url": "text", "valueString": "White" }] }, { "url": "http://hl7.org/fhir/us/core/StructureDefinition/us-core-ethnicity", "extension": [{ "url": "ombCategory", "valueCoding": { "code": "2186-5", "system": "urn:oid:2.16.840.1.113883.6.238", "display": "Non Hispanic or Latino" } }, { "url": "text", "valueString": "Non Hispanic or Latino" }] }, { "url": "http://hl7.org/fhir/us/core/StructureDefinition/us-core-birthsex", "valueCode": "M" }] </pre>

address	array	[{ "postalCode": "72204", "city": "Little rock", "line": ["1515 Wheel Trap Circle"], "period": { "start": "2022-11-16T00:00:10-05:00" }, "state": "AR" }]
communication	array	[{ "language": { "text": "English", "coding": [{ "code": "en", "system": "urn:ietf:bcp:47", "display": "English" }] } }]
managingOrganization	object	{ "reference": "Organization/MAR" }

AllergyIntolerance

Query AllergyIntolerance for a patient's allergies and intolerances. For more information on this resource please refer to the [US Core AllergyIntolerance Profile](#).

Request: GET [base]/AllergyIntolerance{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/AllergyIntolerance?patient=987654>
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID

Response Parameters:

Name	Type	Example
id	string	"12341256375679"

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identifier	array	[{ "type": { "text": "Medical Record Number", "coding": [{ "code": "MR", "system": "http://terminology.hl7.org/CodeSystem/v2-0203", "display": "Medical Record Number" }] }, "system": "https://cert.qrshs.com", "value": "10006" }]
clinicalStatus	object	{ "coding": [{ "code": "active", "system": "http://terminology.hl7.org/CodeSystem/allergyintolerance-clinical", "display": "Active" }] }
verificationStatus	object	{ "coding": [{ "code": "confirmed", "system": "http://terminology.hl7.org/CodeSystem/allergyintolerance-verification", "display": "Confirmed" }] }
code	object	{ "text": "Advil allergy", "coding": [{ "code": "unknown", "system": "http://terminology.hl7.org/CodeSystem/data-absent-reason" }] }
patient	object	{ "reference": "Patient/10006" }
reaction	array	[{ "manifestation": [{ "text": "Hives", "coding": [{ "code": "unknown", "system": "http://terminology.hl7.org/CodeSystem/data-absent-reason" }] }] }

```

        "system": "http://hl7.org/fhir/StructureDefinition/data-absent-reason"
      }
    ]
  }
}
]

```

CarePlan

Query CarePlan for a patient's assessments and plans of treatment. For more information on this resource please refer to the [US Core CarePlan Profile](#).

Request: GET [base]/CarePlan{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/CarePlan?patient=987654>
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID
category	string	optional	Care plan category

Response Parameters:

Name	Type	Example
id	string	"12341256375679"
text	object	{ "status": "additional", "div": "<div xmlns=\"http://www.w3.org/1999/xhtml\">Example narrative text</div>" }
status	string	"active"
category	object	{ "coding": [{ "code": "assess-plan", "system": "http://hl7.org/fhir/us/core/CodeSystem/careplan-category" }] }
subject	object	{ "reference": "Patient/10006" }

CareTeam

Query CareTeam for information on care team members for a patient. For more information on this resource please refer to the [US Core CareTeam Profile](#).

Request: GET [base]/CareTeam{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/CareTeam?patient=987654>
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID
status	string	optional	Team status

Response Parameters:

Name	Type	Example
id	string	"12341256375679"
participant	array	[<pre>{ "member": { "display": "Primary Provider M.D.", "reference": "Practitioner/ref-PCP" }, "role": [{ "text": "Healthcare services (qualifier value)", "coding": [{ "code": "116154003", "system": "http://snomed.info/sct", "display": "Healthcare services (qualifier value)" }] }] }</pre>
subject	object	{ <pre>"reference": "Patient/10006"</pre>

Condition

Query Condition endpoint for patient conditions and problems. For more information on this resource please refer to the [US Core Condition Profile](#).

Request: GET [base]/Condition{parameters}

❖ **Example:** <https://api.qrshs.com/fhir/Condition?patient=987654>

❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID

Response Parameters:

Name	Type	Example
id	string	"12341256375679"
clinicalStatus	object	{ "coding": [{ "code": "active", "system": "http://terminology.hl7.org/CodeSystem/condition-clinical" }] }
verificationStatus	object	{ "coding": [{ "code": "confirmed", "system": "http://terminology.hl7.org/CodeSystem/condition-ver-status" }] }
category	array	[{ "coding": [{ "code": "problem-list-item", "system": "http://terminology.hl7.org/CodeSystem/condition-category", "display": "Problem List Item" }] }]
code	object	{ "coding": [{ "code": "022.3", "system": "http://hl7.org/fhir/sid/icd-9-cm", "display": "ANTHRAX SEPTICEMIA" }] }
subject	object	{ "reference": "Patient/10006" }

Device

Query Device endpoint for patient implantable devices. For more information about this resource, please refer to [US Core Implantable Device Profile](#).

Request: GET [base]/Device{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/Device?patient=987654>
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID

Response Parameters:

Name	Type	Example
id	string	"10006-4602"
status	string	"active"
patient	object	{ "reference": "Patient/10006" }
distinctIdentifier	string	"(01)00643169007222(17)160128(21)BLC200461H"
manufacturer	string	"MEDTRONIC, INC."
manufactureDate	datetime	"2014-09-23T00:00:00.000Z"
modelNumber	string	
udiCarrier	array	[{ "deviceIdentifier": "00643169007222", "carrierHRF": "(01)00643169007222(17)160128(21)BLC200461H", "issuer": "GS1" }]
deviceName	array	[{ "type": "other", "name": "Viva™ Quad XT CRT-D" }]
serialNumber	string	"BLC200461H"
expirationDate	date	"2016-01-28"
lotNumber	string	"28374698273649278"
type	object	{ "coding": [{ "code": "49062001", "system": "http://snomed.info/sct" }] }

DiagnosticReport

Query DiagnosticReport for laboratory results or report and note exchanges. For more information about this resource, please refer to [US Core DiagnosticReport Profile for Laboratory Results Reporting](#) and [US Core DiagnosticReport Profile for Report and Note exchange](#).

Request: GET [base]/DiagnosticReport{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/DiagnosticReport?patient=987654>
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID
category	string	optional	Report type
date	date	optional	Date report created

Response Parameters:

Name	Type	Example
id	string	"10006-pat-14957-5-lab-2010-06-22"
status	string	"final"
category	array	[<pre>{ "coding": [{ "code": "LAB", "system": "http://terminology.hl7.org/CodeSystem/v2-0074" }] }</pre>
Code	object	{ <pre>"coding": [{ "code": "14957-5", "system": "http://loinc.org", "display": "Albumin" }]</pre>
subject	object	{ <pre>"reference": "Patient/10006"</pre>
effectiveDateTime	datetime	"2010-06-22T00:00:10-05:00"
issued	datetime	"2010-06-22T00:00:10-05:00"
performer	array	[<pre>{ "reference": "Practitioner/VET" }</pre>

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result	array	[{ "reference": "Observation/10006-pat-14957-5-obj-2010-06-22" }]
serialNumber	string	"BLC200461H"
expirationDate	date	"2016-01-28"
lotNumber	string	"28374698273649278"
type	object	{ "coding": [{ "code": "49062001", "system": "http://snomed.info/sct" }] }

DocumentReference

Query DocumentReference to view available documents, such as clinical notes. For more information about this resource please refer to [US Core DocumentReference Profile](#).

Request: GET [base]/DocumentReference{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/DocumentReference?patient=987654>
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID
category	string	optional	Document category
type	string	optional	Document type
date	date	optional	Date document created

Response Parameters:

Name	Type	Example
id	string	"10006-pat-ccda-76299-objs-1397572221-0"
identifier	array	[{ "type": { "text": "Medical Record Number", "coding": [{ "code": "MR", "system": "http://terminology.hl7.org/CodeSystem/v2-0203", "display": "Medical Record Number" }] }]],

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		"system": "https://cert.qrshs.com", "value": "10006" }]
status	string	"current"
type	object	{ "coding": [{ "code": "34133-9", "system": "http://loinc.org" }] }
category	array	[{ "coding": [{ "code": "34133-9", "system": "http://loinc.org" }] }]
author	array	[{ "reference": "Practitioner/VET" }]
date	datetime	"2010-06-22T00:00:10-05:00"
subject	array	{ "reference": "Patient/10006" }
context	object	{ "period": { "start": "2014-04-15T00:00:10-05:00", "end": "2014-04-15T00:00:10-05:00" }, "encounter": [{ "reference": "Encounter/76299" }] }
content	array	[{ "attachment": { "data": {excluded for brevity} "contentType": "application/xml" }, "format": { "code": "urn:hl7-org:sdwg:ccda-structuredBody:2.1", "system": "http://ihe.net/fhir/ValueSet/IHE.FormatCode.codesystem" } }]

Goal

Query Goal endpoint for patient goals. For more information about this resource please refer to [US Core Goal Profile](#).

Request: GET [base]/Goal{parameters}

- ❖ **Example:** https://api.qrshs.com/fhir/Goal?patient=987654
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID

Response Parameters:

Name	Type	Example
id	string	"10006-20221111120912"
lifecycleStatus	string	"completed"
subject	array	{ "reference": "Patient/10006" }
description	object	{ "coding": [{ "code": "416528001", "system": "http://snomed.info/sct" }] }
target	array	[{ "dueDate": "2015-11-12", "measure": { "coding": [{ "code": "29463-7", "system": "http://loinc.org", "display": "Body weight" }] } }]

Immunization

Query Immunization for patient immunization and vaccine information. For more information about this resource please refer to [US Core Immunization Profile](#).

Request: GET [base]/Immunization{parameters}

❖ **Example:** <https://api.qrshs.com/fhir/Immunization?patient=987654>

❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID

Response Parameters:

Name	Type	Example
id	string	"10006-111-20180823"
status	string	"not-done"
statusReason	object	{ "coding": [{ "code": "PATOBJ", "system": "http://terminology.hl7.org/CodeSystem/v3-ActReason" }] }
patient	object	{ "reference": "Patient/10006" }
vaccineCode	object	{ "text": "influenza virus vaccine, live, attenuated, for intranasal use", "coding": [{ "code": "111", "system": "http://hl7.org/fhir/sid/cvx", "display": "influenza virus vaccine, live, attenuated, for intranasal use" }] }
occurrenceDateTime	datetime	"2018-08-23T00:00:10-05:00"
primarySource	Boolean	true

MedicationRequest

Query MedicationRequest for patient prescription information. For more information about this resource please refer to [US Core MedicationRequest Profile](#).

Request: GET [base]/MedicationRequest{parameters}

❖ **Example:** <https://api.qrshs.com/fhir/MedicationRequest?patient=987654>

❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID
intent	string	optional	Request type
status	string	optional	Request status



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Response Parameters:

Name	Type	Example
id	string	"96629a50-9ca3-41ff-aa10-62d052dedee"
status	string	"active"
category	array	[{ "coding": [{ "code": "community", "system": "http://terminology.hl7.org/CodeSystem/medicationrequest-category" }] }]
intent	string	"proposal"
reportedReference	object	{ "reference": "Patient/10006" }
medicationCodeableConcept	object	{ "coding": [{ "code": "898367", "display": "benaze medicationCodeableConcept pril hydrochloride 20 MG / hydrochlorothiazide 12.5 MG Oral Tablet", "system": "https://www.nlm.nih.gov/research/umls/rxnorm/index.html" }] }
subject	object	{ "reference": "Patient/10006" }
encounter	object	{ "reference": "Encounter/31293" }
authoredOn	date	"2011-12-19"
requester	object	{ "display": "Veterinarian D.V.M.,Bee A.", "reference": "Practitioner/VET" }
dosageInstruction	array	[{ "text": "1 tablet by mouth daily" }]

Observation

Query Observation for a patient's laboratory tests and results, smoking status, or vital signs profiles. For more information on this resource please refer to [US Core Laboratory Result Observation Profile](#), [US Core Smoking Status Observation Profile](#), and [US Core Vital Signs Profile](#).

Request: GET [base]/Observation{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/Observation?patient=10006&code=8310-5>
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID
category	string	optional	Observation category
date	date	optional	Date of observation
code	string	optional	LOINC code

Response Parameters:

Name	Type	Example
id	string	"10006-111-20180823"
subject	object	{ "reference": "Patient/10006" }
status	string	"final"
category	array	[{ "text": "Vital Signs", "coding": [{ "code": "vital-signs", "system": "http://terminology.hl7.org/CodeSystem/observation-category", "display": "Vital Signs" }] }]
effectiveDateTime	datetime	"2009-07-06T00:00:10-05:00"
code	object	{ "coding": [{ "code": "8310-5", "system": "http://loinc.org", "display": "Body temperature" }] }
valueQuantity	object	{ "code": "[degF]", "unit": "[degF]", "value": 98.6, }

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```
"system": "http://unitsofmeasure.org"
}
```

Procedure

Query Procedure for a patient's procedure history. For more information on this resource please refer to the [US Core Procedure Profile](#).

Request: GET [base]/Procedure{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/Procedure/10006-pat-05-23-2007>
- ❖ **Request Parameters**

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID
date	date	optional	Date of procedure

Response Parameters:

Name	Type	Example
id	string	"10006-111-20180823"
status	string	"completed"
code	object	{ "coding": [{ "code": "17110", "system": "http://www.ama-assn.org/go/cpt", "display": "DESTRUCTION OF WARTS" }] }
subject	object	{ "reference": "Patient/10006" }
performedDateTime	datetime	"2007-05-23T00:00:10-05:00"

Encounter

Query Encounter for a patient's encounter and visit history. For more information on this resource please refer to the [US Core Encounter Profile](#).

Request: GET [base]/Encounter{parameters}

- ❖ **Example:** <https://api.qrshs.com/fhir/Encounter/82588>

❖ Request Parameters

Name	Type	Required	Description
id	string	conditional	Resource ID
patient	string	conditional	Patient ID

Response Parameters:

Name	Type	Example
id	string	"10006-111-20180823"
identifier	array	[{ "system": "http://terminology.hl7.org/CodeSystem/v2-0203", "value": "82588" }]
status	string	"finished"
class	object	{ "code": "AMB", "system": "http://terminology.hl7.org/CodeSystem/v3-ActCode" }
type	array	[{ "text": "Unknown (qualifier value)", "coding": [{ "code": "261665006", "system": "http://snomed.info/sct", "display": "Unknown (qualifier value)" }] }]
subject	object	{ "reference": "Patient/10006" }
period	object	{ "start": "2014-08-25T00:00:10-05:00", "end": "2014-08-25T00:00:10-05:00" }
location	array	[{ "location": { "reference": "Location/CUS" } }]
participant	array	[{ "individual": { "reference": "Practitioner/CHI" } }]

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		<pre> }, "type": [{ "text": "primary performer", "coding": [{ "code": "PPRF", "system": "http://terminology.hl7.org/CodeSystem/v3-ParticipationType", "display": "primary performer" }] }], "period": { "start": "2014-08-25T00:00:10-05:00", "end": "2014-08-25T00:00:10-05:00" } }] </pre>
reasonCode	array	<pre> [{ "coding": [{ "code": "162673000", "system": "http://snomed.info/sct" }] }] </pre>
hospitalization	object	<pre> { "dischargeDisposition": { "coding": [{ "code": "oth", "system": "http://terminology.hl7.org/CodeSystem/discharge-disposition" }] } } </pre>
serviceProvider	object	<pre> { "reference": "Organization/CUS" } </pre>
performedDateTime	datetime	"2007-05-23T00:00:10-05:00"

Provenance

Query Provenance for a records metadata. For more information on this resource please refer to the [US Core Provenance Profile](#).

Request: GET [base]/Provenance{parameters}

❖ **Example:** <https://api.qrshs.com/fhir/Provenance/pat-obj-10006>

❖ Request Parameters

Name	Type	Required	Description
id	string	required	Resource ID

Response Parameters:

Name	Type	Example
id	string	"10006-111-20180823"
target	array	[{ "reference": "Patient/10006" }]
agent	array	[{ "onBehalfOf": { "reference": "Organization/MAR" }, "who": { "reference": "Person/progsup" }, "type": { "coding": [{ "code": "author", "system": "http://hl7.org/fhir/us/core/CodeSystem/us-core-provenance-participant-type" }] } }, { "who": { "reference": "Person/progsup" }, "type": { "coding": [{ "code": "transmitter", "system": "http://hl7.org/fhir/us/core/CodeSystem/us-core-provenance-participant-type" }] } }]

Error and Exceptions

Success or failure of API calls are indicated by standard HTTP status codes. In general, status codes in the 2xx range indicate success and status codes in the 4xx range indicate an error in the request. When an exception is encountered, along with the status code will be a text response providing further details, such as “Authorization Failure”. The standard HTTP codes used are listed below.

Status Code	Description
200	OK
400	Bad Request
401	Unauthorized
403	Forbidden
404	Not Found
405	Method Not Allowed
500	Internal Server Error

Software Requirements

There are no additional components or configurations required to interact with the API.