AXEIUM EHR MU3 API

Introduction

This document provides an overview of the AXEIUM EHR MU3 API. This API provides access to patient information, in accordance to the regulations cited by ONC in 170.315 (g)(7), and(g)(9).

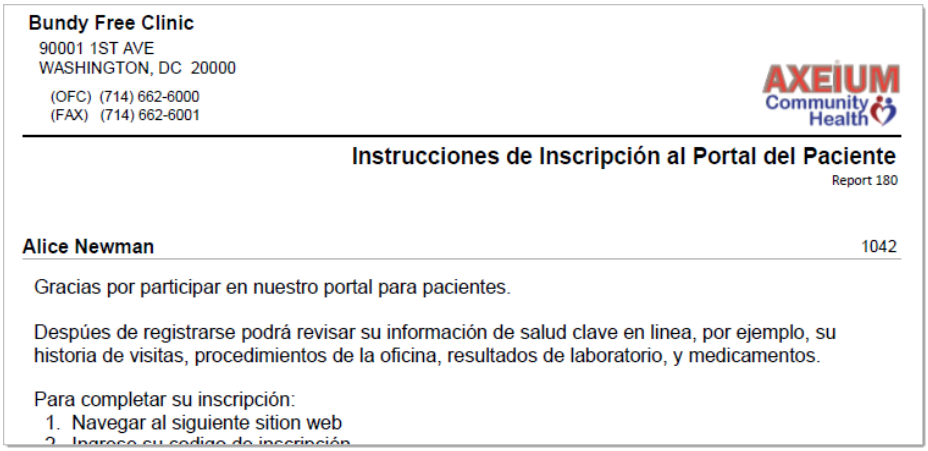
By accessing or using the AXEIUM EHR MU3 APIs, and/or our API Portal, documentation or other developer services/software (collectively, "APIs"), you are agreeing to the **Terms of Use** located at https://axeium.net/api/AXEIUM_EHR_API_Terms_of_Use.pdf

The API can be accessed by any patient of a clinic that is running the MU3 version the AXEIUM EHR system who has provided consent for external access of the clinical information. Upon receiving consent, the clinic provides the following system-generated information to the patient:

a. An access method
b. A user login and password
c. The domain URL

Patient and/or Patient Representative can access patient-specific health data via the above-referenced credentials that are provided by the clinic at the time that the patient consents to electronic document access, which includes access to both the Patient Portal and the USCDI API.

Access instructions are provided to the patient in the patient's primary language when consent is obtained, for example:



Bundy Free Clinic
90001 1ST AVE
WASHINGTON, DC 20000
(OFC) (714) 662-6000
(FAX) (714) 662-6001

AXEIUM Community Health

Instrucciones de Inscripción al Portal del Paciente
Report 180

Alice Newman 1042

Gracias por participar en nuestro portal para pacientes.

Despúes de registrarse podrá revisar su información de salud clave en linea, por ejemplo, su historia de visitas, procedimientos de la oficina, resultados de laboratorio, y medicamentos.

Para completar su inscripción:
1. Navegar al siguiente sition web
2. Ingrese su codigo de inscripción

Key API URLs are as follows:

API endpoint https://[ClinicDomainName]/ccds/ccds.svc

API Help https://[ClinicDomainName]/ccds/ccds.svc/help

API Swagger https://[ClinicDomainName]/ccds/swagger

Architecture of the System

To help users interact with the external API provided by Axeium, a broad overview of the clinical systems architecture is provided as follows:

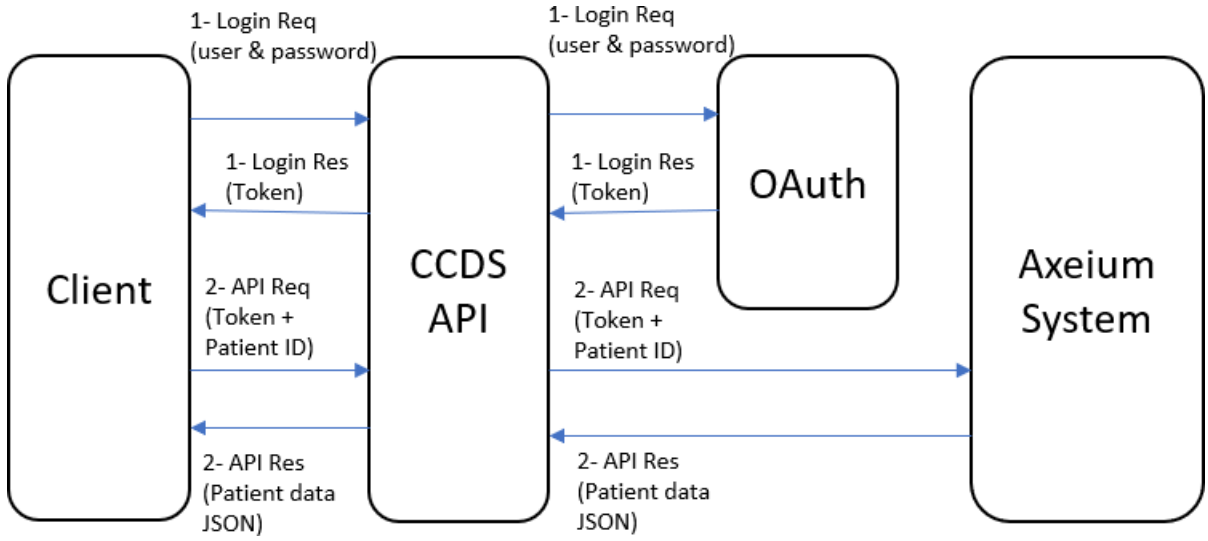


Figure-1: Architecture of Axeium EHR API

API Implementation

The user interaction with the API has three core functions.
Please refer to the architecture diagram (figure-1), shown above.

1. **Login** to the system via OAuth server.
2. **Access Patient** data via the API**.**

The client interaction with respect to Axeium API outlined in ONC 170.315 is as described below.

No	API	Functional Requirement	Axeium API Function(s)
1	170.315 (g)(7)	The technology must be able to receive a request with sufficient information to uniquely identify a patient and return an ID or other token that can be used by an application to subsequently execute requests for that patient's data.	1)Login to Authentication Server 2)Authentication by Axeium API OAuth server The external patient id, and an access token are returned.
3	170.315 (g)(9)	Respond to requests for patient data (based on an ID or other token) for all of the data categories specified at one time and return such data (according to the specified standards, where applicable) in a summary record formatted	Access Clinical data via Web API Request Handler. All data categories, and output format, are passed as parameter. The clinical data of all categories is

		according to the standard specified in §170.205(a)(4) following the CCD document template.	returned in XML format, according to the specified standard.

Security
The Axeium API provides robust multi-level security. The users are authenticated during login, and subsequently every request to the Axeium API is authenticated and authorized.

Login Authentication: The API is singularly focused on clinical data access by authorized parties, as such it does not provide any authentication on its own. Authentication is provided by the clinic's patient portal, which is capable of authenticating valid patients and their authorized representatives.

Authentication in the API, is as described below.
a) The user logs into the system, with a user id and password using API OAuth Authentication Server. If the client credentials are valid, the server returns a reference number, which must be consumed within a predefined time limit.

b) The API Server authenticates the login, using the user ID and reference number that were provided in a previous step. If the authentication is successful, the API Server returns an access token.

Request Authentication and Authorization: After login and authentication by the API Server, the user login and access token received can be used for accessing the clinical API.

Every request to the API is subjected to authentication, wherein the supplied user ID and access token are revalidated.

After successful authentication, the request is subjected to authorization. Every request to the Clinical API must provide HMAC signature of the headers, and content. Authorization is comprised of validating the HMAC signature in the request with the computed signature.

Request authorization is a complex process, and the full details are presented in Appendix-2.

Software Components & Configurations
The API is made available as Web Services, using hypertext transmission protocol (https). The requests and responses use JSON payload, i.e., http content-type=”text/plain” or “application/json”.

The API can be easily accessed using Postman©, or any other software tool or application, capable of sending http requests, and receiving http responses with a json payload.

API Syntax
The external agent must construct web requests, and invoke the API provided by OAuth as detailed below.

Convention: In the following, parameters shown in red, are mandatory.

API **for Client Login:**

Using OAuth Client

```
var authorizationServerUri = new Uri("https://[ClinicDomainName]/_OAUTH");
var authorizationServer = new AuthorizationServerDescription
{
                    AuthorizationEndpoint = new Uri(authorizationServerUri,
"_OAUTH/OAuth/Authorize"),
                    TokenEndpoint = new Uri(authorizationServerUri, "_OAUTH/OAuth/Token")
                };

WebServerClient _webServerClient = new WebServerClient(authorizationServer,
txtClientID.Text, txtSecret.Text);

var state = _webServerClient.GetClientAccessToken(new[] { txtUser.Text, txtPassword.Text
});
string _accessToken = state.AccessToken;

                //Return token
return _accessToken;
```

Appendix 1 - Category Content Notes:

Parameters
Required parameters are identified by an asterisk (*)

Optional parameters, e.g., date range, may be available if the data supports the notion.

Patient Demographics
the following 6 USCDI categories are aggregated and returned in the *Patient* method.

- Sex
- Date of Birth
- Race
- Ethnicity
- Preferred Language
- Smoking Status

Lab Tests
when complete are returned in the *Results* method
and when pending, are returned in the *CarePlan* method.

Reason for Referral
is returned in the *CarePlan* method.

Date Ranges
return values based on the following system transaction dates

API Method	Date Filter Used
Allergy	Onset Date
Assessment	Assessment Date
Care Plan	Encounter Date
Condition	Onset date
Doc Ref (CCD)	Encounter Date
Goal	Encounter Date
Health Concern	Encounter Date
Immunization	Date Given
Lab Result	Result Date
Medication	Order Date
Procedure	Encounter Date
Smoking Status	Encounter Date
Vitals	Encounter Date

Appendix 2 - Available methods

This page describes the service operations, syntax, and parameters at this endpoint.

Uri	Method	Description
AllergyIntolerance	GET	Service at https://localhost/CCDS/ccds.svc/AllergyIntolerance?patient={PATIENT}
Assessment	GET	Service at https://localhost/CCDS/ccds.svc/Assessment?patient={PATIENT}&status={STATUS}&category={CATEGORY}&fromDate={FROMDATE}&toDate={TODATE}
CarePlan	GET	Service at https://localhost/CCDS/ccds.svc/CarePlan?patient={PATIENT}&status={STATUS}&category={CATEGORY}&fromDate={FROMDATE}&toDate={TODATE}
CareTeam	GET	Service at https://localhost/CCDS/ccds.svc/CareTeam?patient={PATIENT}&status={STATUS}
Condition	GET	Service at https://localhost/CCDS/ccds.svc/Condition?patient={PATIENT}&clinicalstatus={CLINICALSTATUS}&category={CATEGORY}&fromDate={FROMDATE}&toDate={TODATE}
Device	GET	Service at https://localhost/CCDS/ccds.svc/Device?patient={PATIENT}
DocumentReference	GET	Service at https://localhost/CCDS/ccds.svc/DocumentReference?patient={PATIENT}&fromDate={FROMDATE}&toDate={TODATE}
DocumentReference/$docref	POST	Service at https://localhost/CCDS/ccds.svc/DocumentReference/$docref
Goal	GET	Service at https://localhost/CCDS/ccds.svc/Goal?patient={PATIENT}&fromDate={FROMDATE}&toDate={TODATE}
HealthConcern	GET	Service at https://localhost/CCDS/ccds.svc/HealthConcern?patient={PATIENT}&clinicalstatus={CLINICALSTATUS}&category={CATEGORY}&fromDate={FROMDATE}&toDate={TODATE}
Immunization	GET	Service at https://localhost/CCDS/ccds.svc/Immunization?patient={PATIENT}&fromDate={FROMDATE}&toDate={TODATE}
LabResults	GET	Service at https://localhost/CCDS/ccds.svc/LabResults?patient={PATIENT}&fromDate={FROMDATE}&toDate={TODATE}
Medication	GET	Service at https://localhost/CCDS/ccds.svc/Medication?patient={PATIENT}&_include={INCLUDE}&fromDate={FROMDATE}&toDate={TODATE}
Patient/{id}	GET	Service at https://localhost/CCDS/ccds.svc/Patient/{ID}

Procedure	GET	Service at https://localhost/CCDS/ccds.svc/Procedure?patient={PATIENT}&fromDate={FROMDATE}&toDate={TODATE}
SmokingStatus	GET	Service at https://localhost/CCDS/ccds.svc/SmokingStatus?patient={PATIENT}&fromDate={FROMDATE}&toDate={TODATE}
Vitals	GET	Service at https://localhost/CCDS/ccds.svc/Vitals?patient={PATIENT}&code={CODE}&category={CATEGORY}&fromDate={FROMDATE}&toDate={TODATE}

Appendix 3 - API Documentation

/AllergyIntolerance

GET /ccds/ccds.svc/AllergyIntolerance?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
    {
```

```
    "fullUrl": "string",
    "resource": {
    "resourceType": "string",
    "id": "string",
    "clinicalStatus": "string",
    "category": "string",
     "verificationStatus": "string",
     "criticality": "string",
     "code": {
       "system": "string",
       "code": "string",
       "display": "string"
     },
     "patient": {
       "reference": "string",
       "display": "string"
     },
     "reaction": {
       "manifestation": {
       "coding": {
          "system": "string",
          "code": "string",
          "display": "string"
        },
        "text": "string"
       }
      }
    },
    "search": "string"
  }
 ]
}
```


Http code 400. Error. Json format


```
{
 "error": "string"
}
```


Http code 401. Error. Json format


```
{
 "error": "string"
}
```


Http code 403. Error. Json format


```
{
 "error": "string"
}
```

Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/Assessment

GET /ccds/ccds.svc/Assessment?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
   {
    "fullUrl": "string",
    "resource": {
    "resourceType": "string",
    "id": "string",
     "status": "string",
     "category": {
     "system": "string",
      "code": "string",
      "display": "string"
     },
     "intent": "string",
     "subject": {
     "reference": "string",
     "display": "string"
     },
     "activity": {
      "outcomeCodeableConcept": {
      "system": "string",
       "code": "string",
       "display": "string"
      },
      "detail": {
```

```
          "status": "string",
          "scheduledDateTime": "string",
          "description": "string"
        }
       }
     },
     "search": "string"
   }
  ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/CarePlan

GET /ccds/ccds.svc/CarePlan?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
   {
    "fullUrl": "string",
    "resource": {
    "resourceType": "string",
    "id": "string",
     "status": "string",
     "category": {
     "system": "string",
      "code": "string",
      "display": "string"
     },
     "intent": "string",
     "subject": {
     "reference": "string",
     "display": "string"
     },
     "activity": {
      "outcomeCodeableConcept": {
      "system": "string",
       "code": "string",
       "display": "string"
      },
      "detail": {
       "status": "string",
       "scheduledDateTime": "string",
       "description": "string"
      }
     }
    },
    "search": "string"
   }
  ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
```

```
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/CareTeam

GET /ccds/ccds.svc/CareTeam?patient=1042

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system

Output result

Http code 200. OK. Json format


```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
   {
    "fullUrl": "string",
    "resource": {
    "resourceType": "string",
    "id": "string",
     "status": "string",
     "subject": {
     "reference": "string",
     "display": "string"
     },
     "participant": {
      "role": {
       "system": "string",
       "code": "string",
       "display": "string"
      },
      "member": {
```

```
          "reference": "string",
          "display": "string"
        }
       }
      },
      "search": "string"
    }
  ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/Condition

GET /ccds/ccds.svc/Condition?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format

```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
    {
      "fullUrl": "string",
      "resource": {
      "resourceType": "string",
      "id": "string",
      "clinicalStatus": "string",
        "verificationStatus": "string",
        "code": {
          "system": "string",
          "code": "string",
          "display": "string"
        },
        "subject": {
          "reference": "string",
          "display": "string"
        },
        "assertedDate": "string"
      },
      "search": "string"
    }
  ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
```

```
}
```

/Device

GET /ccds/ccds.svc/Device?patient=1042

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system

Output result

Http code 200. OK. Json format


```
{
 "resourceType": "string",
 "id": "string",
 "type": "string",
 "total": "string",
 "entry": [
  {
   "fullUrl": "string",
   "resource": {
   "resourceType": "string",
   "id": "string",
    "status": "string",
    "type": {
     "system": "string",
     "code": "string",
     "display": "string"
    },
    "patient": {
     "reference": "string",
     "display": "string"
    },
    "expirationDate": "string",
    "lotNumber": "string",
    "udi": {
     "deviceIdentifier": "string",
     "carrierHRF": "string"
    }
   },
   "search": "string"
  }
 ]
}
```


Http code 400. Error. Json format


```
{
 "error": "string"
```

```
}
```

Http code 401. Error. Json format

```
{
  "error": "string"
}
```

Http code 403. Error. Json format

```
{
  "error": "string"
}
```

Http code 500. Error. Json format

```
{
  "error": "string"
}
```

/DocumentReference

GET /ccds/ccds.svc/DocumentReference?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format

```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
   {
    "fullUrl": "string",
    "resource": {
    "resourceType": "string",
    "id": "string",
     "status": "string",
     "created": "string",
     "content": {
```

```
        "attachment": {
          "contentType": "string",
          "data": "string",
          "url": "string"
        }
       },
       "subject": {
        "reference": "string",
        "display": "string"
       }
      },
     "search": "string"
    }
  ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/DocumentReference/$docref

POST /ccds/ccds.svc/DocumentReference/$docref

Input Parameter.

Http body. Json format


```
{
  "resourceType": "data",
```

```
  "id": "CCDA1042-CCD_VisitHistory_20180818_VDT_E1_V1239_P17-
1",
  "parameter": [
    {
      "name": "patient",
      "valueId": "1042"
    }
  ]
}
```


- **resourceType. Data type string. Mandatory.**
  Complete with “data” string
- **id. Data type string. Mandatory.**
  This is the id value retrieved from documentReference method
- **name. Data type string. Mandatory.**
  This is the entity name. Complete with “patient” string
- **valueid. Data type string. Mandatory.**
  This is the unique patient id from system

Output result

Http code 200. OK. File. XML format

```
CCD XML FILE
```

Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```

/Goal

GET /ccds/ccds.svc/Goal?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
 "resourceType": "string",
 "id": "string",
 "type": "string",
 "total": "string",
 "entry": [
  {
   "fullUrl": "string",
   "resource": {
   "resourceType": "string",
   "id": "string",
    "status": "string",
    "statusDate": "string",
    "description": {
    "system": "string",
     "code": "string",
     "display": "string"
    },
    "subject": {
     "reference": "string",
     "display": "string"
    }
   },
   "search": "string"
  }
 ]
}
```


Http code 400. Error. Json format


```
{
 "error": "string"
}
```


Http code 401. Error. Json format


```
{
```

```
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/HealthConcern

GET /ccds/ccds.svc/HealthConcern?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
    {
      "fullUrl": "string",
      "resource": {
      "resourceType": "string",
      "id": "string",
      "clinicalStatus": "string",
      "assertedDate": "string",
        "verificationStatus": "string",
        "code": {
          "system": "string",
          "code": "string",
          "display": "string"
        },
```

```
      "subject": {
        "reference": "string",
        "display": "string"
      }
    },
    "search": "string"
  }
 ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/Immunization

GET /ccds/ccds.svc/Immunization?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format

```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
    {
      "fullUrl": "string",
      "resource": {
      "resourceType": "string",
      "id": "string",
        "status": "string",
        "notGiven": "string",
        "date": "string",
        "primarySource": "string",
        "vaccineCode": {
          "text": "string",
          "coding": {
          "system": "string",
            "code": "string",
            "display": "string"
          }
        },
        "patient": {
          "reference": "string",
          "display": "string"
        }
      },
      "search": "string"
    }
  ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```

Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/LabResults

GET /ccds/ccds.svc/LabResults?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
   {
    "fullUrl": "string",
    "resource": {
    "resourceType": "string",
    "id": "string",
     "status": "string",
     "category": {
     "system": "string",
      "code": "string",
      "display": "string"
     },
     "valueCodeableConcept": {
      "system": "string",
      "code": "string",
      "display": "string"
     },
     "effectiveDateTime": "string",
     "code": {
      "system": "string",
      "code": "string",
      "display": "string"
     },
     "subject": {
```

```
        "reference": "string",
        "display": "string"
       },
       "performer": {
        "reference": "string",
        "display": "string"
       }
      },
     "search": "string"
    }
  ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/Medication

GET /ccds/ccds.svc/Medication?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
 "resourceType": "string",
 "id": "string",
 "type": "string",
 "total": "string",
 "entry": [
  {
   "fullUrl": "string",
   "resource": {
   "resourceType": "string",
   "id": "string",
    "status": "string",
    "dateAsserted": "string",
    "effectiveDateTime": "string",
    "taken": "string",
    "medicationReference": {
    "reference": "string",
    "display": "string"
    },
    "subject": {
     "reference": "string",
     "display": "string"
    },
    "dosage": {
     "doseDecimal": "string"
    },
    "contained": {
     "resourceType": "string",
     "id": "string",
     "code": {
      "text": "string",
      "coding": {
      "system": "string",
       "code": "string",
       "display": "string"
      }
     }
    }
   },
   "search": "string"
  }
 ]
}
```


Http code 400. Error. Json format


```
{
 "error": "string"
}
```

Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/Patient

GET /ccds/ccds.svc/Patient/{id}

Input Parameters

- **{id}. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system

Output result

Http code 200. OK. Json format


```
{
  "resourceType": "string",
  "id": "string",
  "language": "string",
  "extension": {
    "url": "string",
    "valueCoding": {
    "system": "string",
      "code": "string",
      "display": "string"
    }
  },
  "identifier": {
    "value": "string"
  },
  "active": "string",
  "name": {
  "family": "string",
    "given": "string"
```

```
  },
  "telecom": {
    "system": "string",
    "value": "string",
    "use": "string"
  },
  "gender": "string",
  "birthDate": "string",
  "deceasedBoolean": "string",
  "address": {
    "text": "string",
    "city": "string",
    "state": "string",
    "postalCode": "string",
    "country": "string"
  },
  "maritalStatus": {
    "text": "string"
  }
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/Procedure

GET /ccds/ccds.svc/Procedure?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
 "resourceType": "string",
 "id": "string",
 "type": "string",
 "total": "string",
 "entry": [
  {
   "fullUrl": "string",
   "resource": {
   "resourceType": "string",
   "id": "string",
    "status": "string",
    "performedDateTime": "string",
    "code": {
     "text": "string",
     "coding": {
     "system": "string",
      "code": "string",
      "display": "string"
     }
    },
    "subject": {
     "reference": "string",
     "display": "string"
    }
   },
   "search": "string"
  }
 ]
}
```


Http code 400. Error. Json format


```
{
 "error": "string"
}
```


Http code 401. Error. Json format


```
{
```

```
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


/SmokingStatus

GET /ccds/ccds.svc/SmokingStatus?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
  "resourceType": "string",
  "id": "string",
  "type": "string",
  "total": "string",
  "entry": [
    {
      "fullUrl": "string",
      "resource": {
      "resourceType": "string",
      "id": "string",
        "status": "string",
        "category": {
        "system": "string",
          "code": "string",
          "display": "string"
        },
        "issued": "string",
        "code": {
```

```
        "text": "string",
        "coding": {
        "system": "string",
         "code": "string",
         "display": "string"
        }
       },
       "valueCodeableConcept": {
        "text": "string",
        "coding": {
         "system": "string",
         "code": "string",
         "display": "string"
        }
       },
       "subject": {
        "reference": "string",
        "display": "string"
       },
       "meta": {
        "profile": "string"
       }
      },
     "search": "string"
    }
  ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```

/Vitals

GET /ccds/ccds.svc/Vitals?patient=1042&fromDate=2001-01-01&toDate=2001-12-31

Input Parameters

- **patient. Data type string. Mandatory**
  This is the unique id that identifies the patient in the system
- **fromDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date
- **toDate. Data type string. Date format yyyy-MM-dd. Optional**
  This is the record creation date

Output result

Http code 200. OK. Json format


```
{
 "resourceType": "string",
 "id": "string",
 "type": "string",
 "total": "string",
 "entry": [
  {
   "fullUrl": "string",
   "resource": {
   "resourceType": "string",
   "id": "string",
    "status": "string",
    "category": {
    "system": "string",
     "code": "string",
     "display": "string"
    },
    "effectiveDateTime": "string",
    "criticality": "string",
    "code": {
     "system": "string",
     "code": "string",
     "display": "string"
    },
    "component": {
     "code": {
      "system": "string",
      "code": "string",
      "display": "string"
     },
     "valueQuantity": {
      "value": "string",
      "unit": "string",
      "system": "string",
      "code": "string"
     }
    },
```

```
      "subject": {
        "reference": "string",
        "display": "string"
      }
    },
    "search": "string"
  }
 ]
}
```


Http code 400. Error. Json format


```
{
  "error": "string"
}
```


Http code 401. Error. Json format


```
{
  "error": "string"
}
```


Http code 403. Error. Json format


```
{
  "error": "string"
}
```


Http code 500. Error. Json format


```
{
  "error": "string"
}
```


Appendix 4 - API How to example (Swagger)

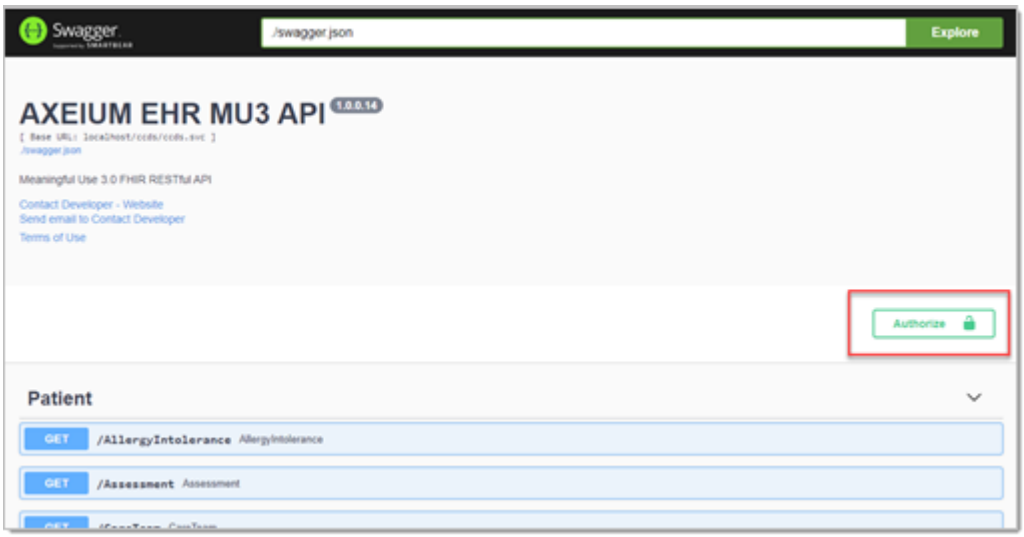
Publically available API method and syntax (Swagger): https://axeium.net/CCDS/swagger

Clinic-specific, functional Swagger for development and testing: https://[ClinicDomainName]/CCDS/swagger

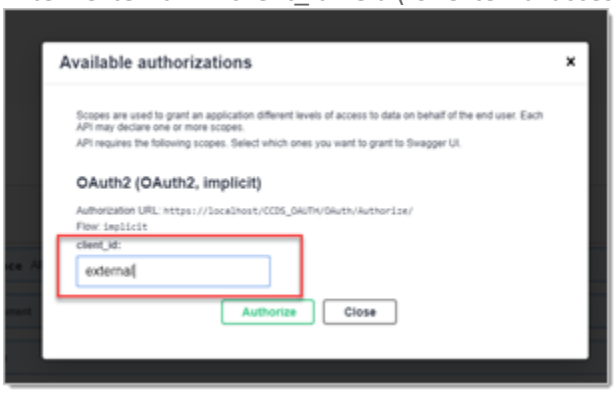
Authentication

Please follow bellow steps to log in using swagger

Access the appropriate clinic-specific Swagger page, and click the Authorize button.



1- Enter “external” in client_id field (for external access), then click the Authorize button.



2 Enter your access credentials, then click the Sign In button.

3 Click the Grant button, to create your time-sensitive access token

4 Click the Close button to acknowledge the access grant,

after which, you will be able to test / execute all of the available API methods.

Available Methods

The API includes 2 method types, GET and POST, the majority of which GET clinical data in JSON output per the FHIR profile that corresponds to each of the Meaningful Use State 3 USCDI information groups, and the POST which is a document-based methods that is used to return a C-CDA Continuity of Care (XML) document.

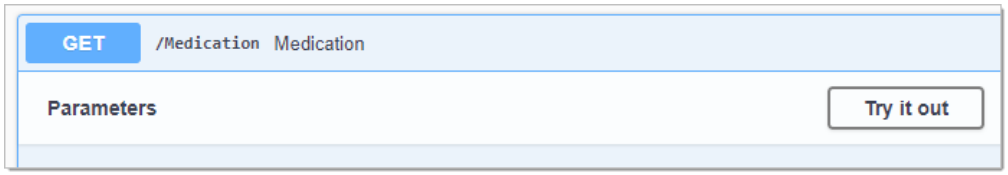
The API methods are based on the C-CDA templates provided by HL7.org, as enumerated in the following document:

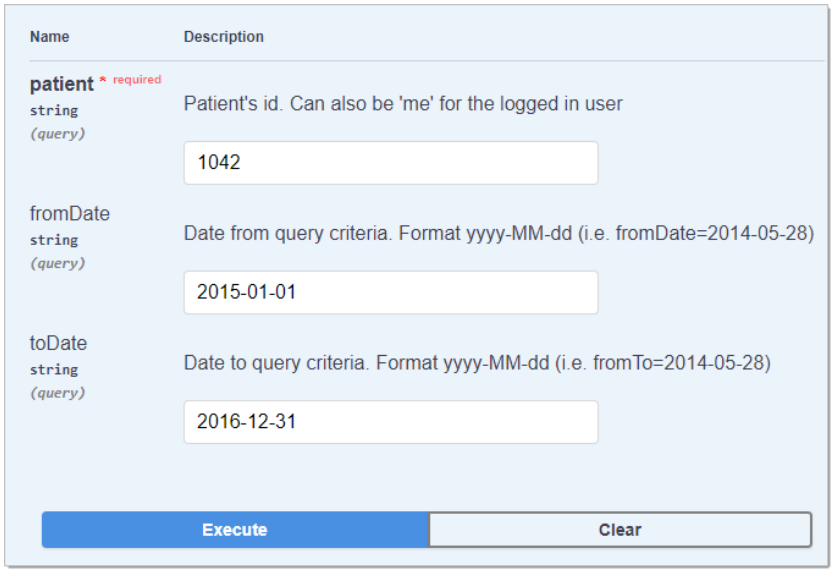
HL7 CDA® R2 IG: C-CDA Templates for Clinical Notes R2.1 Companion Guide, Release 2 - US Realm

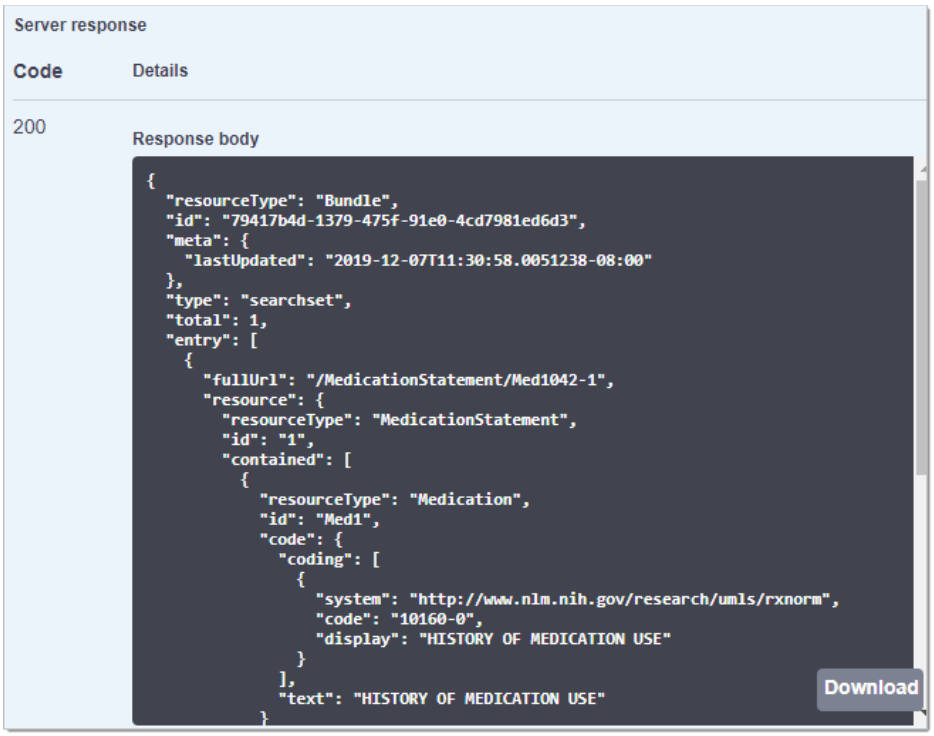
http://www.hl7.org/documentcenter/public/standards/dstu/CDAR2_IG_CCDA_COMPANION_R2_STU_2019OCT.zip

Clinical Data Method Example

- click GET button for desired method
- click Try it out button
- provide runtime parameters
- click Execute







Document Return Protocol

To get a CCD document from the system is a two-step process:
first, run the GET method to return a JSON list of available documents, them run the POST method to return the XML for the specific document requested.

This process is documented at:
http://www.hl7.org/fhir/us/core/2018Jan/OperationDefinition-docref.html

US Core Get DocumentReferences

Formats: XML, JSON, Turtle

OPERATION: US Core Fetch Patient DocumentReferences

This operation is used to return all the references to documents related to a patient.

The operation takes the input parameters:

- patient id
- start date
- end date
- document type

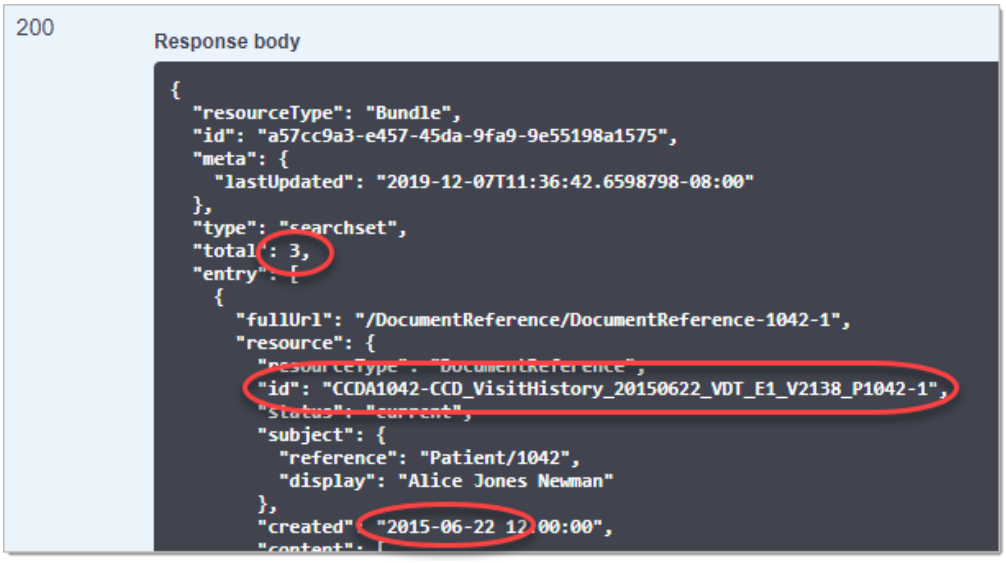
and returns a Bundle off type "searchset" containing resources conforming to the US Core DocumentReference Profile for the patient. If the server has or can create documents that are related to the patient, and that are available for the given user, the server returns the DocumentReference profiles needed to support the records. The principle intended use for this operation is to provide a provider or patient with access to their available document information.

The server SHOULD return at least all references for documents that it has made available in a document indexing system. This is the same as a simple query (`GET [base]/DocumentReference?patient=[id]`). This operaton differs from a simple query in that DocumentReferences may be created 'on-the-fly' in response to this operation. For example, in some cases the documents themselves may not exist but can be generated when needed so a reference to them can be generated using this operation. If no documents exist and an 'on-demand' document cannot be created then the operation will return an empty search bundle.

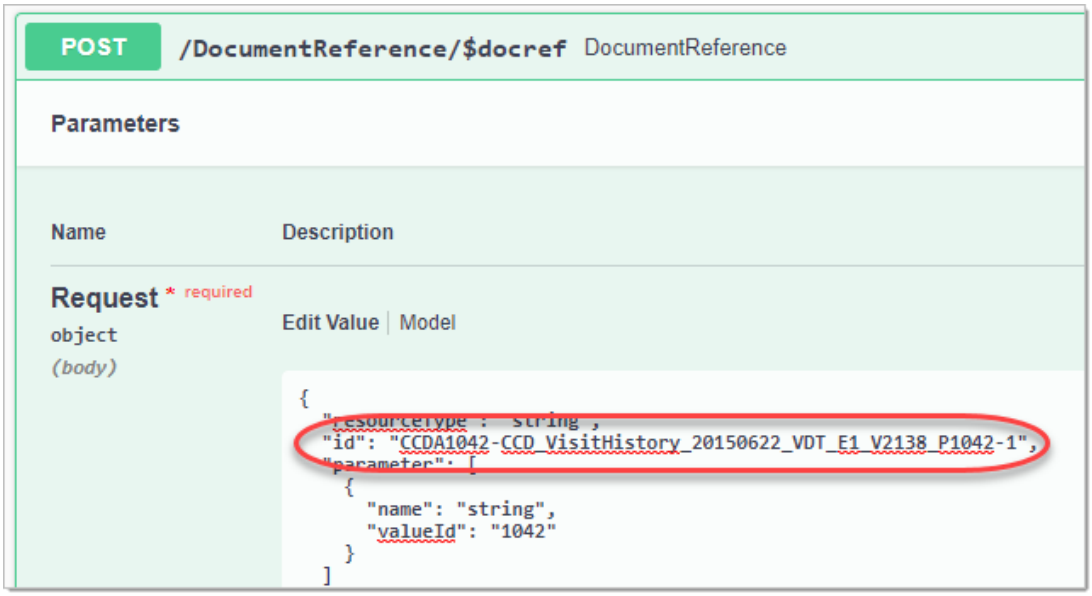
`URL: [base]/DocumentReference/$docref`

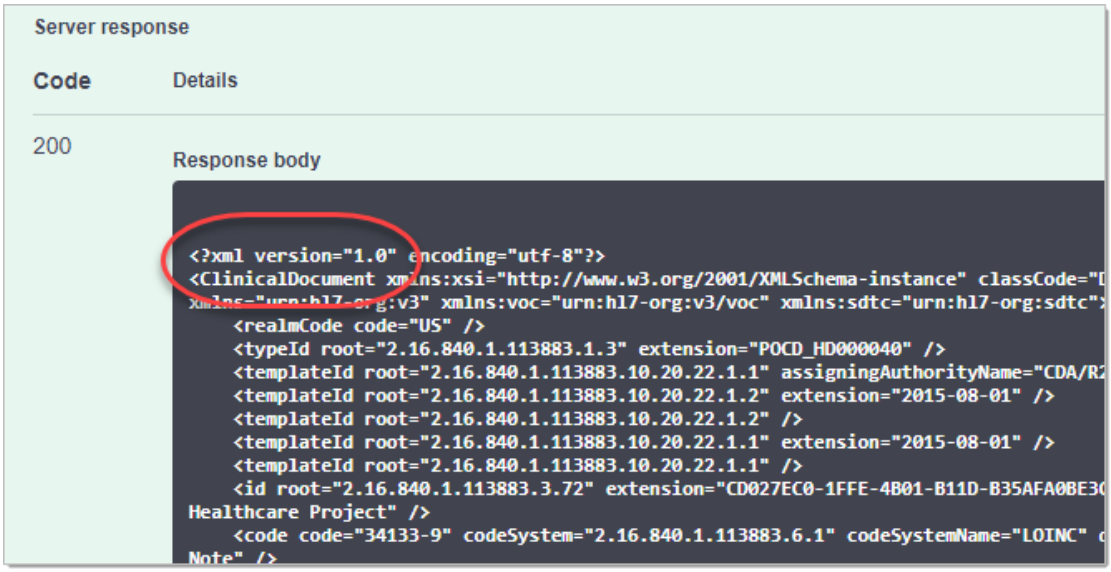
Document Return Example

Key items of note returned from the *DocumentReference* method include: the number of documents returned,, the ID of each document returned, and the date of each document.



The target ID identified from the GET *DocumentReference* method is then supplied to the POST *DocumentReference* method to return the corresponding CCD XML document.





AXEIUM EHR API(s) Terms of Use

By accessing or using the AXEIUM EHR (“AXEIUM”, “We”, or “Our”) APIs, and/or our API Portal, documentation or other developer services/software (collectively, "APIs"), you are agreeing to the Terms of Use (“TOU”) below. If there is a conflict between these terms and additional terms applicable to a given API, the additional terms will control for that conflict. If you use the APIs as an interface to, or in conjunction with, other Brilogy Corporation products or services, then the terms for those other products or services also apply, however this TOU does not alter the terms or conditions of any other agreement you may have with Brilogy Corporation.

SECTION 1: ACCOUNT AND REGISTRATION

a. Acceptance. You may not use the APIs and may not accept the TOU if:

- you are not of legal age to form a binding contract;
- you are a person barred from using or receiving the APIs under the applicable laws of the United States or other countries including the country in which you are resident or from which you use the APIs;
- You and/or any of your affiliates and/or personnel are under or subject to a “Corporate Integrity Agreement” or any other restriction or investigation by any payer, government agency or industry self-regulating organization;
- either you or any of your affiliates, directors or personnel are listed on the General Services Administration’s Excluded Parties List System or suspended or excluded from participation in any Government Payer Programs;
- You are not authorized by the entity on whose behalf you will be using the APIs to bind them to these TOU; or
- there are pending or threatened governmental investigations against You or any of Your affiliates, directors or personnel that may lead to suspension or exclusion from Government Payer Programs or may be cause for listing on the General Services Administration’s Excluded Parties List System.

b. Access. In order to access certain APIs you may be required to provide certain information (such as identification or contact details) as part of the registration process for the APIs, or as part of your continued use of the APIs. You agree to keep all registration information accurate and current. Only the person registering or the Entity for whom he/she is registering may access and use the APIs.

SECTION 2: USING OUR APIs

a. Users of the APIs. Any party using the APIs (including but not limited to developers) must comply with these TOU.

b. Compliance with Law. You will comply with all applicable law, regulation, and third party rights (including without limitation laws regarding the import or export of data or software, privacy, and local laws). You will not use the APIs to encourage or promote illegal activity, violation of third party rights, nor to violate any other license and/or use rights with AXEIUM (or its affiliates).

c. Permitted Access. You will only access (or attempt to access) an API by the means described in the documentation of that API. AXEIUM may issue a unique client identifier for each App you submit to keep track of which Apps use AXEIUM’s APIs. You will not misrepresent or mask either your identity or your API Client's identity when using the APIs or developer accounts. Suspension and/or revocation of an App’s client identifier may be required if there are issues, concerns, or things are otherwise not going well with one of your Apps. If this

happens, your App will not be able to communicate with other systems until the concern is resolved and the suspended client identifier is restored. Contact AXEIUM support to work on resolving the problem that led to the App's client identifier being suspended. Because it is possible that your app will be suspended, you will clearly inform users of your app that it might not always be available to them and that they should not rely on it in an emergency.

Direct access to AXEIUM's application is not required to develop or test your products. Use of the APIs does not grant you permission to access any AXEIUM technology nor the AXEIUM technology used by our customers. And, receipt of direct permission from a licensed AXEIUM customer to test against their system without the specific, written permission of AXEIUM, shall be deemed a violation of these TOU.

d. API Limitations. AXEIUM sets and enforces limits on your use of the APIs (e.g., limiting the number of API requests that you may make or the number of users you may serve), in our sole discretion. You agree to, and will not attempt to circumvent, such limitations documented with each API. If you would like to use any API beyond these limits, you must obtain AXEIUM's express, written consent (and AXEIUM may decline such request or condition acceptance on your agreement to additional terms and/or charges for that use).

e. Intellectual Property. No transfer or grant of rights under any AXEIUM Intellectual Property is made or is to be implied by any provision of these Term of Service. You agree not to infringe upon such rights or decompile, reverse engineer, or disassemble any of AXEIUM's products or processes. Use of any AXEIUM intellectual property is subject to our discretion and can change without prior notice.

f. On-going Communication/Feedback. We may send you certain communications about your use of the APIs. Please review the applicable API documentation for information about opting out of certain types of communication. If you provide feedback or suggestions about our APIs, then we (and those we allow) may use such information without obligation to you.

g. Non-Exclusivity. The TOU are non-exclusive. You acknowledge that AXEIUM may develop products or services that may compete with the API Clients or any other products or services.

SECTION 3: YOUR API CLIENTS

a. API Clients and Monitoring. THE APIS ARE DESIGNED TO HELP YOU ENHANCE YOUR WEBSITES AND APPLICATIONS ("API CLIENT(S)"). YOU AGREE THAT AXEIUM MAY MONITOR USE OF THE APIS TO ENSURE QUALITY, IMPROVE AXEIUM PRODUCTS AND SERVICES, AND VERIFY YOUR COMPLIANCE WITH THE TERMS. AXEIUM may suspend access to the APIs by you or your API Client without notice if we reasonably believe that you are in violation of the TOU.

b. Security. You will use commercially reasonable efforts to protect user information and/or any other HIPAA related data collected and/or used by your API Client, including Individually Identifiable Health Information ("IIHI"), from unauthorized access or use and will promptly report to your users any unauthorized access or use of such information to the extent required by applicable law, including HIPAA, HITECH and applicable State security regulations associated with patient data. Your App must not pose a direct risk or otherwise increase the risk of a security breach in any system it connects to. Data exchange between your API Client and AXEIUM's APIs and between your API Client and any other third-party system must be secured with industry standard encryption while in transit, and use authentication and authorization protocols. Your API Client must secure all data on an end-user's device, and enforce inactivity time-outs. You and your API Client must not introduce any code of a destructive nature into any system you or your API Client connect to. Your API Client's client identifier is given to you for your use only for a single API Client. You agree to keep your API Client's client identifier confidential, and will not disclose it to any third party, or use it for any other purpose.

c. Ownership. By using our APIs, you do not acquire ownership of any rights in our APIs or the content that is accessed through our APIs.

d. User Privacy and API Clients. Your API Client must not circumvent the display of any authentication or consent mechanisms from AXEIUM nor violate applicable federal, state or local law, including HIPAA, HITECH and applicable State privacy regulations, associated with patient and personal data. You will provide and adhere to a privacy policy for your API Client that clearly and accurately describes to users of your API Client, what user information you collect, and how you use and share such information with AXEIUM and third parties.

e. Sharing. You may not share the data collected by your API Client with any third party without the explicit consent of the user of the API Client and the patient whose data is being shared.

SECTION 4: INDEMNIFICATION, DISCLAIMER OF WARRANTIES, LIMITATIONS ON LIABILITY.

a. Indemnification. You agree to indemnify, hold harmless and defend AXEIUM, its subsidiaries, their affiliates, and all the employees, officers, directors, contractors and other personnel of any of them from and against any liabilities, damages, losses, costs, fees (including legal fees), and expenses relating to any allegation or third-party legal proceeding to the extent arising from: (i) your misuse or your end user's misuse of the APIs; (ii) your violation or your end user's violation of the TOU; or (iii) any content or data routed into or used with the APIs by you, those acting on your behalf, or your end users.

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SECTION 5: HEALTHCARE CONSIDERATIONS.

As an API Client developer operating in the healthcare industry, you are obligated to be familiar with principles for responsible healthcare App development and usage.

Section 6: GENERAL

a. Governing Law and Venue. Except as set forth below: (i) the laws of California, U.S.A., excluding California's conflict of laws rules, will apply to any disputes arising out of or related to the TOU or the APIs and (ii) ALL CLAIMS ARISING OUT OF OR RELATING TO THE TERMS OR THE APIS WILL BE LITIGATED EXCLUSIVELY IN THE FEDERAL OR STATE COURTS OF ORANGE COUNTY, CALIFORNIA, USA, AND YOU AND AXEIUM CONSENT TO PERSONAL JURISDICTION IN THOSE COURTS.

If you are accepting the TOU on behalf of a United States federal government entity, then the following applies instead of the paragraph above: the laws of the United States of America, excluding its conflict of laws rules, will apply to any disputes arising out of or related to the TOU or the APIs. Solely to the extent permitted by United States Federal law: (i) the laws of the State of California (excluding California's conflict of laws rules) will apply in the absence of applicable federal law; and (ii) FOR ALL CLAIMS ARISING OUT OF OR RELATING TO THE TERMS OR THE APIS, THE PARTIES CONSENT TO PERSONAL JURISDICTION IN, AND THE EXCLUSIVE VENUE OF, THE COURTS IN ORANGE COUNTY, CALIFORNIA. If you are accepting the TOU on behalf of a United States city, county, or state government entity, then the following applies instead of the paragraph above: the parties agree to remain silent regarding governing law and venue.

b. Captions. The captions of the paragraphs in these TOU of Service are included only for your convenience and shall not affect the meaning, construction, or effect hereof.

c. Survival. Rights and obligations under these TOU of Service which by their nature should survive will remain in full force and effect after termination or expiration.

d. Waiver. Any waiver or failure of AXEIUM to exercise promptly any right under these TOU of Use will not create a continuing waiver or any expectation of non-enforcement.

e. Severability. If any provision, clause or part, or the application of a provision, clause or part of these TOU of Service is held by a court of competent jurisdiction to be invalid, illegal, or unenforceable, such provision, clause or part, may be reduced in scope by the court to the extent it deems necessary to render it reasonable and enforceable. The remainder of these TOU of Service shall not be affected.

f. Contact Information. You can send e-mail to AXEIUM with any questions relating to these TOU of Use at legal@brilogy.com.

g. Modification We may modify the TOU or any portion to, for example, reflect changes to the law or changes to our APIs. You should look at the TOU regularly. We'll post notice of modifications to the TOU within the documentation of each applicable API, to this website, and/or in the AXEIUM developer's site. Changes will not apply retroactively and will become effective no sooner than 30 days after they are posted. But changes addressing new functions for an API or changes made for legal reasons will be effective immediately. If you do not agree to the modified TOU for an API, you should discontinue your use of that API. Your continued use of the API constitutes your acceptance of the modified TOU.

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