Open Dental Software

FHIR Interface Specification

For Open Dental 19.3

January 8, 2021

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About Open Dental FHIR

Open Dental has a RESTful API service that conforms to the FHIR standard defined by https://www.hl7.org/fhir. This FHIR service can be used to look up and create patient and appointments. For a detailed, technical description of Open Dental FHIR's capabilities, see the Capability Statement in Appendix A.

This document describes the FHIR implementation in Open Dental v. 19.3. The version of FHIR used in this implementation is 4.0.0.

These are the resources currently accessible through the FHIR API:
- AllergyIntolerance
- Appointment
- Condition
- Location
- Medication
- MedicationStatement
- Organization
- Patient
- Practitioner
- Procedure
- ServiceRequest
- Schedule
- Slot
- Subscription

These resources allow the GET method (meaning that the data can be retrieved through the API). Four resources additionally implement the POST and PUT method (resources can be created and updated through the API): Appointment, Patient, Subscription, and Procedure.

Versions – What's Changed

As of 19.3, new API keys will need to be created from the developer portal. See API Keys for details on generating and assigning API keys.

API Endpoint

The current version of the API has the following endpoint:
- https://api.opendental.com/fhir/v2

Testing Credentials

Open Dental hosts a test database for developers to play with FHIR. The base URL is the same endpoint listed above. The Capability Statement on this server gives a detailed, technical description of Open Dental's FHIR capabilities.

The following test credentials can be used:

Developer Key: NFF6i0KrXrxDkZHt

Customer API Key: VzkmZEaUWOjnQX2z

Request Format

Each API request must include an Authorization header in this format:

Authorization: ODFHIR {developerKey}/{customerAPIKey}

A browser extension or other software such as Postman or cURL is necessary to send request headers.

Resources

Important notes concerning the functionality of resources are given here. To see a complete list of resources along with the methods and search parameters supported, see the Capability Statement.

AllergyIntolerance

Risk of harmful or undesirable, physiological response which is unique to an individual and associated with exposure to a substance.

Operations Supported: Read
Fields supported:

Field	Comments
identifier	The primary key of the database row (allergy.AllergyNum)
clinicalStatus	active, inactive
verificationStatus	Currently always confirmed
type	allergy, intolerance, none
category	food, medication, environment, none
code	Text description of the allergy
patient	The person who has the intolerance
recordedDate	Date record was believed accurate
lastOccurance	Date of last known occurrence of a reaction
note	Additional notes entered concerning the allergy
reaction	Adverse reaction events linked to exposure to substance

Search parameters:

Name	Type	Comments
category	token	The category of this allergy. Either food, medication, or environment. Determined based on the allergy def

		allergy type (allergydef.SnomedType).
clinical-status	token	Whether the allergy is active or not. Possible values are active or inactive.
code	token	Code that identifies the allergy or intolerance. Corresponds to the name of the allergy or the name of the medication or the RxCui of the mediciation (allergydef.Description, medication.MedName, or medication.RxCui).
date	date	Date record was believed accurate. Corresponds to the last time this row was updated (allergy.DateTStamp).
identifier	string	The logical Id of the AllergyIntolerance. This is the same value as allergy.AllergyNum.
last-date	date	The date a reaction was recorded. Corresponds to allergy.DateAdverseReaction.
patient	reference	Who the sensitivity is for (allergy.PatNum).
type	token	The underlying mechanism (allergy or intolerance). Determined based on the allergy def allergy type (allergydef.SnomedType).

Additional details: https://www.hl7.org/fhir/allergyintolerance.html

Appointment

An appointment for a patient

Operations Supported: Read, Create, Update
Fields supported:

Field	Comments
identifier	Corresponds to appointment.AptNum
status	proposed, pending, booked, etc. See below for all statuses
priority	Scale of 1 to 9, 1 as highest, 9 as lowest
start	The beginning of the appointment
end	The end of the appointment
minutesDuration	The number of minutes the appointment lasts
comment	Corresponds to appointment.Note
participant	Used to specify the patient, provider, and operatory
participant.status	On the patient participant, used to update the confirmation status on the appointment
reasonReference	These are a list of Procedure resources that are attached to this appointment
basedOn	These are a list of Service Request resources that are the reason for this appointment
plannedApptOrder	For an appointment of status proposed, this is the

| | | priority/order of the planned appointment. If not specified, the appointment will be put at the end of the list. |

Search parameters:

Name	Type	Comments
patient	reference	The patient on the appointment. Corresponds to appointment.PatNum.
location	reference	The operatory in which the appointment is scheduled. Corresponds to appointment.Op.
identifier	string	The logical Id of the appointment. This is the same value as appointment.AptNum.
practitioner	reference	The provider or hygienist on the appointment. Corresponds to appointment.ProvNum or appointment.ProvHyg.
status	token	The status of the appointment.
date	date	The start time of the appointment. This corresponds to appointment.AptDateTime.
_lastUpdated	date	The last time any of the fields in the appointment were modified (this includes fields that are stored in the database and not transferred through FHIR). This corresponds to appointment.DateTStamp.

Additional details: https://www.hl7.org/fhir/appointment.html

See Use Case 3 to see an example of creating an appointment.
See Use Case 4 to see an example of updating an appointment.

The statuses on a FHIR Appointment resource correspond to the following appointment statuses in Open Dental:

      proposed – An appointment that is planned
      pending – An appointment on the Unscheduled List
      booked – An appointment with a status of Scheduled or ASAP
      arrived – An appointment that has a value in the Time Arrived field but not in the Time Dismissed field
      fulfilled – An appointment with a status of Complete
      cancelled – An appointment that has been deleted
      noshow – An appointment with a status of Broken

The statuses on the patient participant correspond to the following appointment confirmation statuses in Open Dental:

      needsaction – The offices default unconfirmed status
      accepted – The offices default confirmed status

When creating an appointment, the following fields are required: Patient, location (operatory), and status. If a practitioner is not specified, the provider scheduled in that operatory for that time slot is used. If there is none, the patient's primary provider is used. If a secondary provider is not specified, the hygienist for the operatory is used if the preference to use the secondary provider from the operatory is set. Otherwise, the patient's secondary provider is used.

When updating an appointment, all fields that are supported by Open Dental's FHIR implementation will be updated. See Use Case 4 for how to update a single field.

Condition

Detailed information about conditions, problems or diagnoses. These are referred to as Problems in Open Dental.

Operations Supported: Read
Fields supported:

Field	Comments
identifier	The primary key of the database row (disease.DiseaseNum)
clinicalStatus	active, inactive, resolved
verificationStatus	Currently always confirmed
code	May contain the SNOMED, ICD9, or ICD10 code or a text description
subject	The patient who has this condition
onsetDateTime	The date the condition began
abatementDateTime	If/when in resolution/remission
note	Additional information about the Condition

Search parameters:

Name	Type	Comments
abatement-date	date	Date-related abatements as a dateTime. Equivalent to disease.DateStop.
clinical-status	token	The clinical status of the condition. Based on disease.ProbStatus.
code	token	Code for the condition. Uses either diseasedef.SnomedCode, diseasedef.Icd10Code, diseasedef.ICD9Code, or diseasedef.DiseaseName.
identifier	string	The logical Id of the Condition. Equivalent to disease.DiseaseNum.
onset-date	date	Date related onsets as a dateTime. Equivalent to disease.DateStart.
patient	reference	Who has the condition? Equivalent to disease.PatNum.
subject	reference	Who has the condition? Equivalent to disease.PatNum.

Additional details: https://www.hl7.org/fhir/condition.html

Location

A location corresponds to an operatory within Open Dental.

Operations Supported: Read
Fields supported:

Field	Comments
identifier	Corresponds to operatory.OpNum
status	active, inactive
name	Correspondes to operatory.OpName
description	Correspondes to operatory.OpName
mode	Always instance
telecom	Contact information for the clinic the operatory belongs to
address	Always room
managingOrganization	The clinic the operatory belongs to

Search parameters:

Name	Type	Comments
address	string	The physical address of the clinic to which the operatory is assigned. Corresponds to any value in clinic.Address, clinic.Address2, clinic.City, clinic.State, clinic.Zip.
address-city	string	The city of the clinic to which the operatory is assigned. Corresponds to clinic.City.
address-postalcode	string	The zip code of the clinic to which the operatory is assigned. Corresponds to clinic.Zip.
address-state	string	The state of the clinic to which the operatory is assigned. Corresponds to clinic.State.
identifier	string	The logical Id of the location. This is the same value as operatory.OperatoryNum.
name	string	The name or abbreviation of the operatory. Corresponds to operatory.OpName or operatory.Abbrev.
organization	reference	The clinic to which the operatory is assigned. Corresponds to operatory.ClinicNum.
status	token	The status 'active' corresponds to an operatory that is not hidden. The status 'inactive' corresponds to an operatory that is hidden.

Additional details: https://www.hl7.org/fhir/location.html

Medication

Definition of a Medication.

Operations Supported: Read
Fields supported:

Field	Comments
code	Either an RxNorm or a text description
status	Currently always active

Search parameters:

Name	Type	Comments
code	token	Codes that identify this medication. Corresponds to the name of the medication or the RxCui of the mediciation (medication.MedName or medication.RxCui).
identifier	string	The logical Id of the Medication. This is the same value as medication.MedicationNum.

Additional details: https://www.hl7.org/fhir/medication.html

MedicationStatement

Record of medication being taken by a patient.

Operations Supported: Read
Fields supported:

Field	Comments
identifier	The primary key of the database row (medicationpat.MedicationPatNum)
status	active, completed
medicationCodeableConcept	A text description of the medication
medicationReference	Reference to the Medication resource
effectivePeriod	The interval when the medication was taken
effectiveDateTime	The date when the medication was taken
dateAsserted	When the statement was asserted
subject	The patient who is taking the medication
note	Further information about the medication

Search parameters:

Name	Type	Comments
code	token	Returns statements of this medication code. Equivalent to medicationpat.MedName.
effective	date	Date when patient was taking (or not taking) the

		medication. Based on medication.DateStart and medication.DateStop.
identifier	string	The logical Id of the Medication. This is the same value as medicationpat.MedicationPatNum.
medication	reference	Returns statements of this medication reference. Equivalent to medicationpat.MedicationNum.
patient	reference	Returns statements for a specific patient. Equivalent to medicationpat.PatNum.
status	token	Returns statements that match the given status. Only 'active' and 'completed' are supported.
subject	reference	Returns statements for a specific patient. Equivalent to medicationpat.PatNum.

Additional details: https://www.hl7.org/fhir/medicationstatement.html

Each MedicationStatement will have an effectivePeriod present when the start and the stop dates are entered for the medication and it will have an effectiveDateTime when only the start date is entered.

Organization

One Organization represents the practice as entered within Open Dental under Setup -> Practice. Every other Organization resource is a clinic within Open Dental.

Operations Supported: Read
Fields supported:

Field	Comments
identifier	0 if this Organization is the practice, otherwise clinic.ClinicNum
name	Correspondes to clinic.Abbr.
telecom	The practice or clinic phone number
address	The practice or clinic physical address
partOf	If this is a clinic, will point to the practice

Search parameters:

Name	Type	Comments
address	string	The physical or billing address of the clinic or practice. Corresponds to any value in clinic.Address, clinic.Address2, clinic.City, clinic.State, clinic.Zip, clinic.BillingAddress, clinic.BillingAddress2, clinic.BillingCity, clinic.BillingState, clinic.BillingZip.
address-city	string	The city of the clinic or practice. Corresponds to clinic.City or clinic.BillingCity.
address-postalcode	string	The zip code of the clinic or practice. Corresponds to clinic.Zip or clinic.BillingZip.

identifier	string	The logical Id of the clinic or practice. This is the same value as clinic.ClinicNum, however the dental practice can be represented as a Clinic resource with a logical Id of 0.
name	string	The name of the clinic or practice. Corresponds to clinic.Abbr.
partof	reference	All clinics are a partof the practice Organization.

Additional details: https://www.hl7.org/fhir/organization.html

Patient

An individual for whom care is provided

Operations Supported: Read, Create
Fields supported:

Field	Comments
identifier	An identifier for this patient. Corresponds to patient.PatNum
active	Whether this patient's record is in active use.
name	A name associated with the patient.
telecom	A contact detail for the individual.
gender	AdministrativeGender
birthDate	The date of birth for the individual.
deceasedDateTime	The date time deceased for the individual.
address	Address for the individual. Can include multiple lines. The first will correspond to the patient.address and the second, if included, will be put in the patient.address2.
maritalStatus	Marital (civil) status of a patient.
photo	Image of the patient. Must include the parameter includePhoto=true
communication	The patient's preferred language
careProvider	Patient's nominated primary care provider.
managingOrganization	Patient's assigned clinic.

Search parameters:

Name	Type	Comments
active	token	Whether a patient is active or not. A value of 'true' corresponds to a patient.PatStatus of Patient. A value of 'false' corresponds to a patient.PatStatus of anything other than Patient.
address	string	The address of the patient. Corresponds to any value in patient.Address, patient.Address2, patient.City, patient.State, patient.Zip, or patient.Country.

address-city	string	The patient's city. Corresponds to patient.City.
address-postalcode	string	The patient's zip code. Corresponds to patient.Zip.
address-state	string	The patient's state. Corresponds to patient.State.
birthdate	date	The patient's birthdate. This corresponds to patient.Birthdate.
careprovider	reference	The patient's primary provider. Corresponds to patient.PriProv.
deathdate	date	The date time the patient passed away. This corresponds to patient.DateTimeDeceased.
deceased	token	Whether a patient deceased or not. A value of 'true' corresponds to a patient.PatStatus of Deceased or a value is entered in patient.DateTimeDeceased. A value of 'false' corresponds to a patient.PatStatus of anything other than Deceased and no value is entered in papatient.DateTimeDeceased.
email	string	The patient's email. Corresponds to patient.Email.
family	string	The patient's family (last) name. Corresponds to patient.LName.
gender	token	The patient's gender. Corresponds to patient.Gender. The genders 'other' and 'unknown' correponds to Unknown in Open Dental.
given	string	The patient's given (first or middle) name. Corresponds to patient.FName or patient.MiddleI.
identifier	string	This can match either the business id of the patient or the patient's Social Security Number. This corresponds to patient.PatNum or patient.SSN. If intending to search for the SSN, the token's system should be 'http://hl7.org/fhir/sid/us-ssn'.
language	string	The patient's primary language. A two- or three-letter ISO langauge tag is accepted. Because Open Dental only stores a patient's langauge and not their language region, searches for en-US, en-UK, or en-CA will match all patients whose language is English.
name	string	The patient's name. Corresponds to a portion of patient.FName, patient.MiddleI, or patient.LName.
organization	reference	The clinic to which the patient is assigned. Corresponds to patient.ClinicNum.
phone	string	A patient's phone number. Corresponds to patient.HmPhone, patient.WkPhone, or patient.WirelessPhone.
telecom	string	A patient's phone number or email. Corresponds to patient.HmPhone, patient.WkPhone, patient.WirelessPhone, or patient.Email.
_lastUpdated	date	The last time any of the fields in for the patient were

		modified (this includes fields that are stored in the database and not transferred through FHIR). This corresponds to patient.DateTStamp.
includePhoto	token	Custom search parameter. To reduce bandwidth, the Patient.photo element is excluded by default. To have the photo included, this parameter must be included with a value of 'true'.
phoneNumberMatch	token	Custom search parameter. This parameter can be used to search for patients whose phone number is a partial match. Any non-digit characters are ignored both in the parameter value and in the database value.

Additional details: https://www.hl7.org/fhir/patient.html

See Use Case 3 to see an example of creating a patient.

Practitioner

A Practitioner corresponds to a provider in Open Dental, usually a dentist or a hygienist.

Operations Supported: Read
Fields supported:

Field	Comments
identifier	Corresponds to provider.ProvNum
active	True or false
name	The first and last name of the provider
gender	Currently this field will be always unknown
practitionerRole	role will be either 'provider' or 'hygienist'. Specialty is drawn from the provider specialties within Open Dental. These specialties are user-editable and do not conform to any code system.

Search parameters:

Name	Type	Comments
family	string	The practitioner's family (last) name. Corresponds to provider.LName.
given	string	The practitioner's given (first or middle) name. Corresponds to provider.FName or provider.MI.
identifier	string	The logical id of the practitioner. This is the same value as provider.ProvNum.
name	string	The practitioner's name. Corresponds to a portion of provider.FName, provider.MI, or patient.provider.
role	token	The provider's role in the practice. The parameter values supported are 'provider' and hygienist'. The former

		corresponds to provider.IsSecondary=0 and the latter corresponds to provider.IsSecondary=1.
specialty	string	The provider's specialty. These parameter values are the values set up within Open Dental as provider specialties.

Additional details: https://www.hl7.org/fhir/practitioner.html

Procedure

A Procedure corresponds to a completed procedure in Open Dental.

Operations Supported: Read, Create, Update
Fields supported:

Field	Comments
identifier	Corresponds to procedurelog.ProcNum.
partOf	Corresponds to attached procedure (procgroupitem table) if the current procedure is a Group Note.
status	Corresponds to procedurelog.ProcStatus. Always a status of "completed".
category	Corresponds to procedurecode.ProcCat and the matching name of the definition. Only included with read requests. Cannot update.
code	Corresponds to procedurecode.ProcCode.
subject	Reference to the patient attached to the procedure. Corresponds to procedurelog.PatNum.
performedDateTime	The date the procedure was performed. Corresponds to procedurelog.ProcDate.
performer	The performer of the procedure. In this case, the actor corresponds to the practitioner (procedurelog.ProvNum). The onBehalfOf field represents the Organization attached to this procedure (procedurelog.ClinicNum).
bodySite	The location on the body where the procedure occurred. Can correspond to procedurelog.Surf or procedurelog.ToothNum. See section below on Reading/Writing the bodySite.
location	Corresponds to the OpNum of the appointment this procedure is attached to. Only included with read requests. Cannot update.
note	Corresponds to the procnote table. The most recent procnote will be included in the read request.

Search parameters:

Name	Type	Comments

code	token	The code of the procedure. Corresponds to procedurecode.ProcCode.
patient	reference	The patient for this procedure. Corresponds to procedurelog.PatNum.
date	date	The date this procedure occured. Corresponds to procedurelog.ProcDate.
identifier	string	The id of the procedure. Corresponds to procedurelog.ProcNum.
performer	reference	The performer for the procedure. Must be a practitioner. Corresponds to procedurelog.ProvNum.
location	reference	The location for the procedure. Corresponds to the operatory number of the appointment this procedure is attached to (appointment.op).

Additional details: http://hl7.org/fhir/procedure.html

See Use Case 5 for an example of inserting and updating a procedure.

Reading/Writing the bodySite:
The bodySite field can store information in the procedurelog.Surf and/or procedurelog.ToothNum. FHIR uses two code systems to implement surface and tooth number. The system for surface will be stored in procedurelog.Surf. If the exact surface is not in the system, such as MOL, multiple surfaces can be included and will be concatenated together (include M, O, and L). The tooth number system will be used to set procedurelog.ToothNum when specifying a specific tooth. The quadrants can also be specified and will be set in procedurelog.Surf. Only set the quadrant if the procedure applies to the entire section of the mouth. See Use Case 5 for an example of inserting and updating the bodySite.

When updating a procedure, all fields that are supported by Open Dental's FHIR implementation will be updated sans location and category. This means if a field is ommitted in the update request, it will be set back to its default value.

ServiceRequest

A ServiceRequest corresponds to a treatment planned procedure in Open Dental. This resource was named ProcedureRequest in version 19.1 of Open Dental.

Operations Supported: Read, Create
Fields supported:

Field	Comments
identifier	Corresponds to procedurelog.ProcNum.
status	Corresponds to procedurelog.ProcStatus. Always a status of "active".
intent	The intent of the procedure request. Always set to intent of "proposal".
category	Currently this field will be always unknown

code	Corresponds to procedurecode.ProcCode.
subject	Reference to the patient attached to the procedure. Corresponds to procedurelog.PatNum.
occurenceDateTime	The date the procedure will occur. Corresponds to procedurelog.ProcDate.
authoredOn	The date the procedure was initially created. Only included with read requests. Cannot update.
performer	The performer of the procedure. In this case, the actor corresponds to the practitioner (procedurelog.ProvNum).
bodySite	The location on the body where the procedure occurred. Can correspond to procedurelog.Surf or procedurelog.ToothNum. See section in Procedure: Reading/Writing the bodySite.
note	Corresponds to the procnote table. The most recent procnote will be included in the read request.

Search parameters:

Name	Type	Comments
code	token	The code of the service request. Corresponds to procedurecode.ProcCode.
patient	reference	The patient for this service request. Corresponds to procedurelog.PatNum.
occurrence	date	The date this service request will occur. Corresponds to procedurelog.ProcDate.
identifier	string	The id of the service request. Corresponds to procedurelog.ProcNum.
performer	reference	The performer for the service request. Must be a practitioner. Corresponds to procedurelog.ProvNum.

Additional details: http://hl7.org/fhir/servicerequest.html

Schedule

Operations Supported: Read
Fields supported:

Field	Comments
identifier	An alphanumeric string that identifies the date and provider/location
actor	Can include a Location and/or Practitioner.
planningHorizon	One full day

Search parameters:

Name	Type	Comments
actor	reference	The actor on the schedule.
date	date	The date of the schedule. Unless an identifier parameter is included, the dates being searched must be a finite date range.
identifier	string	The logical id of the schedule.

Additional details: https://www.hl7.org/fhir/schedule.html

A Schedule resource will exist for a Practitioner if the provider has a schedule set for that day within Open Dental. Every operatory in Open Dental will have a Schedule resource for every day. If no date range is specified for a GET call, then the schedules for the next 28 days will be returned.

Slot

Operations Supported: Read
Fields supported:

Field	Comments
identifier	An alphanumeric string that identifies the date, provider/location, and the start and end.
schedule	Reference to the Schedule resource for this Slot
freeBusyType	free, busy
start	The start date and time of the slot
end	The end date and time of the slot
overbooked	If the provider is scheduled for multiple appointments at this time, will be true

Search parameters:

Name	Type	Comments
identifier	string	A Slot Identifier. The logical id of the Slot. A parameter of either 'identifier' or 'schedule' must be included.
schedule	reference	The Schedule Resource that we are seeking a slot within. A parameter of either 'identifier' or 'schedule' must be included.
start	date	The start time of the slot.
status	token	The free/busy status of the appointment. The code system must be http://hl7.org/fhir/slotstatus.

Additional details: https://www.hl7.org/fhir/slot.html

Slots are divided into five, ten, or fifteen minute intervals (depending on the appointment time increment preference). A Slot that is linked to a Schedule that is linked to a Practitioner will be considered free if there is a schedule within Open Dental for that provider during that time and the

provider is not scheduled for an appointment during that time. A Slot that is linked to a Location will be considered free if that operatory has a provider scheduled for that time and the operatory is an operatory considered for Web Sched and there is no appointment in that Slot.

Subscription

Operations Supported: Read, Create, Update, Delete
Fields supported:

Field	Comments
criteria	The rules for this subscription
contact	Contact details for the subscription
reason	Description of why this subscription was created
status	requested, active, error, off
error	Latest error note
channel	The channel on which to report matches to the criteria
end	When to automatically delete the subscription

Search parameters:

Name	Type	Comments
contact	string	The value for a contact field for the Subscription.
criteria	string	Rule for server push criteria.
payload	string	Mimetype to send, or blank for no payload.
status	token	The status of the Subscription. System must be http://hl7.org/fhir/ValueSet/subscription-status.
type	token	The type of the Subscription channel. System must be http://hl7.org/fhir/ValueSet/subscription-channel-type.
url	uri	The endpoint of the Subscription channel.
identifier	string	The logical id of the practitioner.

Additional details: https://www.hl7.org/fhir/subscription.html

Subscriptions can be used to find out about changes that occur to Patients and Appointments. The channel type that is supported is rest-hook, so when a change occurs, an empty POST request is sent to the channel endpoint. A notification will be sent anytime there is a change in the Patient or Appointment database tables, so it is possible that a notification will be sent even though the resource as returned by FHIR has the exact same fields.

To uses Subscriptions, the Open Dental eConnector service must be running. The interval at which the service sends out notifications can be set in the Open Dental program in Setup -> Advanced Setup -> FHIR.

Use Cases

All the following use cases can be performed on the demo server using the specified URLs.

Use Case 1 – Appointments for Date

Find all appointments scheduled for clinic Hogwarts Hospital Wing for January 3rd, 2018.

- The client will find out the id for the Hogwarts Hospital Wing clinic by querying the Organization resource:
  https://api.opendental.com/fhir/v2/organization?name=Hogwarts%20Hospital%20Wing

- Then the client will need all the Locations that have Hogwarts Hospital Wing for their organization (we'll say the id for Hogwarts Hospital Wing is 1):
  https://api.opendental.com/fhir/v2/location?organization=Organization/1

- The client can now query the Appointment resources (suppose that the location returned above has the id of 2 and 3):
  https://api.opendental.com/fhir/v2/appointment?location=2,3&date=2018-01-03&status=booked

Use Case 2 – List of Patients Webhook Subscription

Keep an updated list of patients who have Madame Pomfrey as a provider

- The client will find out the id for Madame Pomfrey by querying the Practitioner resource:
  https://api.opendental.com/fhir/v2/practitioner?family=pomfrey&given=madame

- This will return a Practitioner resource. In this case the id for that resource will be 1.

- The client will then issue a query against the patient resources like the following:
  https://api.opendental.com/fhir/v2/patient?careprovider=Practitioner/1

- To be informed of new patients that are assigned Madame Pomfrey as their provider, the client then creates a Subscription resource like this one:

```
{
  "criteria": "patient?careProvider=Practitioner/1",
  "contact": [
    {
      "system": "email",
      "value": "andrew@friendsofopendental.com",
      "use": "work",
      "rank": 1,
      "period": {
        "start": "2016-08-01T08:00:00"
      }
    }
  ],
  "reason": "To provider surveys to Madame Pomfrey's patients to
determine her quality of care",
  "status": "requested",
  "channel": {
    "type": "rest-hook",
    "endpoint": "http://www.friendsofopendental.com/fhirpatients"
  },
  "end": "2018-01-01T00:00:00"
```

```
}
```

Then the client will perform a POST request it to this URL:
https://api.opendental.com/fhir/v2/opendentalfhir/subscription

- Every few minutes Open Dental's EConnector will check active subscriptions and if any match the criteria, it will send an empty POST request to the endpoint URL (http://www.friendsofopendental.com/fhirpatients) that was included when the Subscription was created.

- When the client receives that POST request, it can issue the same query with a parameter for the time that it last checked:
https://api.opendental.com/fhir/v2/patient?careprovider=Practitioner/1&_lastupdated=ge2016-09-21T18:37:10

Use Case 3 – Find an opening and create an appointment

Find a time where an appointment is not scheduled in the operatory named 'Madame Pomfrey's Operatory' for March 17th, 2017, and create an appointment for a patient named Penelope Clearwater with the provider Madame Pomfrey. Create the patient if she does not exist.

- The client will first find the operatory id for the operatory using this query:
https://api.opendental.com/fhir/v2/location?name=madame+pomfrey%27s+operatory

- Using the returned id of 1, issue a query for the schedule for that location for that day:
https://api.opendental.com/fhir/v2/schedule?actor=Location/1&date=2017-03-17

- The id from that resource will be 20170317L1. That id will be used for the 'schedule' parameter for the Slot resource:
https://api.opendental.com/fhir/v2/slot?schedule=20170317L1&status=free

- Using the list of available slots, we can now pick a time for the appointment. We'll pick 8:00 AM for this example.

- Then to find the patient for this appointment, we will issue this query:
https://api.opendental.com/fhir/v2/patient?family=clearwater&given=penelope

- If this returns 0 results, we will need to create the patient by submitting a POST request to https://api.opendental.com/fhir/v2/patient

```
{
  "name": [
    {
      "use": "usual",
      "family": "Clearwater",
      "given": "Penelope"
    }
  ],
  "telecom": [
    {
      "system": "phone",
      "value": "(123)456-7890",
      "use": "home"
```

```
      }
  ],
  "gender": "female",
  "birthDate": "1996-09-19"
}
```

- The value from the Location header of the response will be the id for the patient on the appointment (in this case, 157).

- The next step is to find the id for the provider Madam Pomfrey. This is the query that will be used: https://api.opendental.com/fhir/v2/practitioner?family=pomfrey&given=madame

- Using the id of 1 returned from the last query, we can construct the appointment resource.

```
{
  "status": "booked",
  "priority": 5,
  "start": "2017-03-17T08:00:00",
  "end": "2017-03-17T08:40:00",
  "minutesDuration": 40,
  "participant": [
    {
      "type": [
        {
          "code": [
            {
              "system": "http://hl7.org/fhir/participant-type",
              "code": "PART"
            }
          ]
        }
      ],
      "actor": {
        "reference": "Patient/157"
      },
      "status": "needsaction"
    },
    {
      "type": [
        {
          "code": [
            {
              "system": "http://hl7.org/fhir/participant-type",
              "code": "PPRF"
            }
          ]
        }
      ],
      "actor": {
        "reference": "Practitioner/1"
      }
```

```
      },
      {
        "type": [
          {
            "code": [
              {
                "system": "http://hl7.org/fhir/participant-type",
                "code": "PART"
              }
            ]
          }
        ],
        "actor": {
          "reference": "Location/1"
        }
      }
    ]
}
```

- Now, posting to https://api.opendental.com/fhir/v2/appointment should return an HTTP status code of 201.

Use Case 4 – Updating an appointment status

Find a specific appointment through a GET request, modify the appointment status field, and PUT the update to the server while including all unmodified fields.

- First, we need to get the appointment we want to modify. In this case, the appointment we want is at ID 4. Send a GET request to Fthe following URL:
  https://api.opendental.com/fhir/v2/appointment/4

- Now, we need to modify the appointment status field in the returned payload. We want to set the status to "Complete" in Open Dental which is represented by fulfilled.

```
{
  "status": "fulfilled",
  "priority": 5,
  "start": "2017-03-17T08:00:00",
  "end": "2017-03-17T08:40:00",
  "minutesDuration": 40,
  "participant": [
    {
      "type": [
        {
          "code": [
            {
              "system": "http://hl7.org/fhir/participant-type",
              "code": "PART"
            }
          ]
        }
      ]
    }
```

```
      ],
      "actor": {
        "reference": "Patient/1"
      },
      "status": "needsaction"
    },
    {
      "type": [
        {
          "code": [
            {
              "system": "http://hl7.org/fhir/participant-type",
              "code": "PPRF"
            }
          ]
        }
      ],
      "actor": {
        "reference": "Practitioner/6"
      }
    },
    {
      "type": [
        {
          "code": [
            {
              "system": "http://hl7.org/fhir/participant-type",
              "code": "PART"
            }
          ]
        }
      ],
      "actor": {
        "reference": "Location/1"
      }
    }
  ]
}
```

- Now, PUTing to https://api.opendental.com/fhir/v2/appointment/4 should return an HTTP status code of 200.

Use Case 5 – Creating and updating a procedure

Use a POST request to a post a procedure. Then, use a PUT request to modify the procedure by changing its tooth, surface, and attached provider.

- First, we need to create the procedure for the given patient. We will send the post request to the following URL:

https://api.opendental.com/fhir/v2/procedure

```json
{
    "status":"completed",
    "code":{
        "coding":[
            {
                "system":"http://hl7.org/fhir/us/sid/cdt",
                "code":"D2331",
                "display":"resin-based composite - two surfaces,
anterior"
            }
        ]
    },
    "subject":{
        "reference":"Patient/5",
        "display":"Harry Potter"
    },
    "performedDateTime":"2016-07-27T00:00:00",
    "performer":[
        {
            "actor":{
                "reference":"Practitioner/1",
                "display":"Madame S. Pomprey, DMD"
            },
            "onBehalfOf":{
                "reference":"Organization/1",
                "display":"Hogwarts Hospital Wing"
            }
        }
    ],
    "bodySite":[
        {
            "coding":[
                {
                    "system":"http://hl7.org/fhir/ex-tooth",
                    "code":"36",
                    "display":"36",
                    "userSelected":false
                },
                {
                    "system":"http://hl7.org/fhir/FDI-surface",
                    "code":"D",
                    "display":"Distal",
                    "userSelected":false
                },
                {
                    "system":"http://hl7.org/fhir/FDI-surface",
                    "code":"L",
```

```
                        "display":"Lingual",
                        "userSelected":false
                    }
                ]
            }
        ],
        "note":[
            {
                "text":"This is the note."
            }
        ]
}
```

- Now, this procedure has been inserted into the database. Take the id received in the response and use it to post the update. We want to update the tooth to 46, the surface to MOD, and the provider to Practitioner/2.
  NOTE: We can simply use the code MOD as it is one of the predefined surfaces for this system. If the surface is not predefined, update the surface similar to how we created it above.

- Send the following JSON as a PUT Request to:
  https://api.opendental.com/fhir/v2/procedure/ID_Goes_here

- A 200 status should be receieved, and the result should include the updated fields.

```
{
    "status":"completed",
    "code":{
        "coding":[
            {
                "system":"http://hl7.org/fhir/us/sid/cdt",
                "code":"D2331",
                "display":"resin-based composite - two surfaces,
anterior"
            }
        ]
    },
    "subject":{
        "reference":"Patient/5",
        "display":"Harry Potter"
    },
    "performedDateTime":"2016-07-27T00:00:00",
    "performer":[
        {
            "actor":{
                "reference":"Practitioner/2"
            },
            "onBehalfOf":{
                "reference":"Organization/1",
```

```
                    "display":"Hogwarts Hospital Wing"
                }
            }
        ],
        "bodySite":[
            {
                "coding":[
                    {
                        "system":"http://hl7.org/fhir/ex-tooth",
                        "code":"46",
                        "display":"46"
                    },
                    {
                        "system":"http://hl7.org/fhir/FDI-surface",
                        "code":"MOD"
                    }
                ]
            }
        ],
        "note":[
            {
                "text":"This is the note."
            }
        ]
}
```

Setting up FHIR

As of 18.4, the FHIR web service is hosted at Open Dental headquarters. All requests will be routed through this address to the appropriate office. This moves away from the old method of each office hosting their own FHIR service. The API Key specified in the Authorization header is linked to a specific office.

Steps to Enable FHIR

In order to use FHIR, the office must have an eConnector running. See https://www.opendental.com/manual/econnector.html for installation instructions.

1. Launch the Open Dental program. Enable FHIR by going to Setup -> Advanced Setup -> FHIR and checking the Enabled checkbox.

2. If using subscriptions for appointments or patients, enter a value in the "Process subscription interval in minutes".

API Keys

When requesting data from the FHIR server, an API key must be present in the request header. API keys are created by the 3rd-party developer from Open Dental's developer portal: https://api.opendental.com/portal/gwt/fhirportal.html. The API keys created from the developer portal can be entered into the Open Dental program to assign that API key to a customer. Requests to

our API using these keys must then include the developer API key and the customer API key. To obtain a developer API key, contact vendor.relations@opendental.com.

To assign an API key to an Open Dental customer, go to Setup -> Advanced Setup -> FHIR. Click the Add Key in the lower left. Here is where you paste a key generated from the developer portal. The customer has the ability to enable or disable a key. The customer can view permissions granted to that key, but they cannot change those permissions.