

# Controlled Medication Unified Platform

## ePrescription Integration Quick Reference Guide

<b>Company:</b>	شركة انديبندنت هيلث لخدمات تكنولوجيا المعلومات (ذ.م.م) - انهيلث
<b>Author:</b>	Andrius Šimėnas, Colin Bleach
<b>Creation Date:</b>	10/12/2017
<b>Date Modified:</b>	02/04/2019
<b>Version:</b>	1.5

## Table of Contents

1	Introduction.....	3
1.1	Terms and concepts.....	3
2	General information on System Integration Endpoints .....	3
2.1	System URLs: .....	4
2.2	Authentication .....	4
2.2.1	Authentication process .....	4
2.2.1.1	Requesting an access token for the External IS.....	4
2.2.1.2	Querying user information from token .....	5
2.2.1.3	Querying data with access token.....	5
2.3	Request and response types .....	6
2.3.1	Request to retrieve Resource (GET).....	6
2.3.1.1	Single resource request .....	6
2.3.1.2	Multiple resource request.....	8
3	Create ePrescription (MedicationRequest) .....	12
3.1	Integration scenario.....	12
3.1.1	Create Prescription.....	12
3.1.2	Cancel Prescription .....	18
3.1.3	Create Patient .....	19
3.1.4	Bundle Resource.....	21
4	Get ePrescription (MedicationRequest) .....	24
5	Dispense Medication integration scenario (MedicationDispense) .....	29
5.1	Integration scenario.....	29
5.1.1	Retrieve ePrescriptions .....	30
5.1.2	Lock the Prescription.....	34
5.1.3	Dispense Medication .....	35
5.1.4	Mark Prescription as dispensed .....	37
5.1.5	Cancel Dispensed Prescription .....	37
6	Get ePrescription (MedicationDispense).....	38
7	Integration endpoint Request errors.....	44
8	Notification Codes and Description: .....	44
9	Clinician License Number and Drug Codes .....	44
10	Overriding requests .....	45

## 1 INTRODUCTION

This document describes main integration scenarios and message examples involved in creating Prescriptions for Controlled or Semi-Controlled Medications and in dispensing Medications.

Note: Current version of the document describes the intended and designed System integration interfaces, data structures and integration scenarios. During the design, testing, and other subsequent stages of the Project, this document can be refined in accordance with the actual Project implementation results.

### 1.1 TERMS AND CONCEPTS

The table below describes the terms used in the document and references to related documents and other sources.

**Table 1 Terms used in the document**

No	Term	Description / reference
1	CNM	Controlled (Narcotic) or Semi-Controlled Medicine
2	FHIR	Fast Healthcare Interoperability Resources. Specification describing the FHIR technological standard is publicly available at <a href="http://hl7.org/implement/standards/fhir/">http://hl7.org/implement/standards/fhir/</a>
3	System	CNM ePrescription IS
4	External IS (Integrated System)	Healthcare Institution IS or Pharmacy IS, that is integrating with the System (i.e., with CNM ePrescription IS)

## 2 GENERAL INFORMATION ON SYSTEM INTEGRATION ENDPOINTS

To retrieve data from / submit data to the System, External IS needs to access System Integration Endpoints. Integration Endpoints are presented in the REST architecture via Integration Endpoints, data can be sent and received (as HL7 FHIR resources) in JSON and XML(UTF-8 encoding) format using HTTP POST, PUT and GET queries. HTTP requests will be sent to a specific Endpoint's URL. For retrieving the requests in XML and JSON format, header "Content-Type" need to change as "application/json" for JSON and "application/XML" for XML.

Endpoint URL addresses and parameters for all requests are case-sensitive, i.e., request to "Encounter" integration endpoint will not be executed, if requester tries to address "encounter" or "ENCOUNTER" in the URL.

Special symbols in the request parameters (i.e., |) must be encoded as described in: <http://www.rfc-editor.org/rfc/rfc1738.txt> section 2.2. URL Character Encoding Issues.

Authentication, System Integration Endpoints and the search parameters are described below.

## 2.1 SYSTEM URLS:

- Test Environment: <https://erxqa.inhealth.ae/blaze/>
- Production Environment: <https://hie.inhealth.ae/blaze/>

## 2.2 AUTHENTICATION

To authenticate and/or authorize the users (i.e., External IS) OAuth2 is used.

### 2.2.1 Authentication process

The server should provide client-credential flow for server-to-server integration between applications. Every server application will have own client identifier and secret.

#### 2.2.1.1 *Requesting an access token for the External IS*

For an External IS to get a System access token, an OAuth 2.0 request to the token endpoint of the Server needs to be made. To compose the token request following details are needed:

- The token endpoint URL of the server.
- The client ID and secret to compose the HTTP basic authentication header. Please email [cm\\_support@inhealth.ae](mailto:cm_support@inhealth.ae) to get External IS credentials.

```
-- Request token with Username and password are combined into a
-- string "username:password" and encoded using BASE64
POST https://erxqa.inhealth.ae/cas/oidc/token
Authorization: Basic aABCDdds010s
Content-Type: application/x-www-form-urlencoded
grant_type=client_credentials
```

**Fig. 1 Access token request example**

```
-- Successful response to token request
HTTP/1.1 201 OK
Content-Type: application/json
Cache-Control: no-store
Pragma: no-cache
{
  "access_token": "eAT-2-2-C48VsdFDF7kNEVUt852n_Rk1_fWhq-_u",
```

```

"token_type": "Bearer",
"expires_in": 3599,
"scope": "address phone email profile",
"id_token":
"eyJraWQiOiJyc2ExIiwiaWF0IjYxMjYwXlc0NSTVRlc3QqLCJ...."
}
    
```

**Fig. 2 Successful access token response example**

If the client authentication has failed, the Server will return an HTTP error 40X, and no access token will be issued.

### 2.2.1.2 Querying user information from token

Use returned access token as Bearer token in authorization header for authentication.

```

GET https://erxqa.inhealth.ae/cas/oidc/profile
Authorization: Bearer AT-2-2-C48VB7P7kNSDUt852n_Rk1_fWhq-_u
    
```

**Fig. 3 User information request example**

```

{
  "sub": "test",
  "auth_time": 1213766936,
  "app": "ExternalISName123"
  "org": "organisation_business_id"
}
    
```

**Fig. 4 User information response example**

### 2.2.1.3 Querying data with access token

Use returned access token as Bearer token in authorization header for authentication and id token for identity.

```

GET {{SystemURL}}/Organization/123
Authorization: Bearer eyJraWQiOiJyc2ExIiwiaWF0IjYxMjYwXlc0NSTVRlc3....
    
```

**Fig. 5 Data access token request example**

## 2.3 REQUEST AND RESPONSE TYPES

### 2.3.1 Request to retrieve Resource (GET)

In order to receive Resource data from the System, External IS must submit GET request to corresponding REST integration point.

#### 2.3.1.1 *Single resource request*

GET request for a Resource with its FHIR identifier, for example

```
GET {{SystemURL}}/Practitioner/123
```

where 123 is FHIR identifier of the Practitioner that External IS wants to retrieve. Response to such request is single Resource with given FHIR identifier:

```
{
  "id": "123",
  "name": [
    {
      "use": "official",
      "text": "SOPHIE MARIEMONEDAAMOROSO",
      "given": [
        "SOPHIE "
      ],
      "family": "MARIEMONEDAAMOROSO"
    }
  ],
  "active": true,
  "gender": "female",
  "identifier": [
    {
      "value": "XYiui30125",
      "period": {
        "end": "2020-05-09T00:00:00.0000+04:00",
        "start": "2016-05-09T00:00:00.0000+04:00"
      },
      "system": "http://fhir.inhealth.ae/LicenseNumber"
    }
  ],
}
```

```

"resourceType": "Practitioner",
"qualification": [
  {
    "code": {
      "coding": [
        {
          "code": "Specialty",
          "system":
"http://fhir.inhealth.ae/PractitionerSpecialityTypes",
          "display": "Registered Nurse"
        },
        {
          "code": "SubSpecialty",
          "system":
"http://fhir.inhealth.ae/PractitionerSubSpecialityTypes",
          "display": "Registered Nurse"
        }
      ]
    }
  }
],
"meta": {
  "lastUpdated": "2018-11-14T13:45:23Z",
  "versionId": "3"
}
}

```

**Fig. 6 Single resource request response**

Note, that FHIR identifier is not part of the Response body. FHIR identifier is provided in the response’s header parameter content-location (together with Resource’s actual version):

```

...
content-location → {{SystemURL}}/Practitioner/453455/_history/

```

In the event of an error, the reply header will list the error status HTML code and the FHIR OperationOutcome resource describing the error. For example, when querying for a non-existing Patient resource, 404 Not Found code and OperationOutcome resource as shown in Fig.7 below:

```
{
  "resourceType": "OperationOutcome",
  "issue": [
    {
      "severity": "error",
      "code": "not-found",
      "details": {
        "text": "Practitioner/453455 not found"
      }
    }
  ]
}
```

**Fig. 7 Response to the request for a non-existing resource**

### 2.3.1.2 Multiple resource request

If GET request results in multiple Resources that satisfy search criteria, multiple Resources will be returned in the Response. In order to get all the Medications, External IS has to submit GET request

```
GET {{SystemURL}}/Medication
```

Such requests may often return multiple Resources, all of them satisfying given search criteria. Resource Bundle is returned in this case, returning the total count of Resources and paging information. By default, 10 Resources are returned in the single page.

```
{
  "resourceType": "Bundle",
  "type": "searchset",
  "total": 1380,
  "link": [
    {
      "relation": "self",
```



```

        "url": "/Medication?_page=1"
    },
    {
        "relation": "first",
        "url": "/Medication?_page=1"
    },
    {
        "relation": "last",
        "url": "/Medication?_page=139"
    },
    {
        "relation": "next",
        "url": "/Medication?_page=2"
    }
],
"entry": [
    {
        "resource": {
            "resourceType": "Medication",
            "id": "12154",
            "code": {
                "coding": [
                    {
                        "system":
"http://fhir.inhealth.ae/AbuDhabiActiveIngredientCode",
                        "code": "01341",
                        "display": "Clonazepam 0.25% Drops"
                    },
                    {
                        "system": "http://fhir.inhealth.ae/DrugGroup",
                        "code": "1",
                        "display": "1"
                    },
                    {
                        "system":
"http://fhir.inhealth.ae/DubaiActiveIngredientCode",
                        "code": "260404-163",
                        "display": "Clonazepam 0.25% Drops"
                    }
                ]
            }
        }
    }
]

```

```

    }
  ]
},
"status": "active",
"form": {
  "coding": [
    {
      "system": "http://hl7.org/fhir/ValueSet/medication-
form-codes",
      "display": "Drops"
    }
  ]
},
"ingredient": [
  {
    "itemCodeableConcept": {
      "coding": [
        {
          "system":
"http://fhir.inhealth.ae/ActiveIngredients",
          "code": "Clonazepam",
          "display": "Clonazepam"
        },
        {
          "system":
"http://fhir.inhealth.ae/DispensingMode",
          "code": "CM",
          "display": "Controlled Drug-CD"
        }
      ]
    },
    "isActive": true,
    "amount": {
      "numerator": {
        "value": 0.25,
        "unit": "%",
        "system": "http://hl7.org/fhir/ValueSet/ucum-
units",
        "code": "%"
      }
    }
  }
]

```

```

        },
        "denominator": {
            "value": 1
        }
    }
}
]
}
}...

```

**Fig. 8 Response to a Multiple resource request**

In order to search for a Patient that has a name John, External IS must submit GET request:

```
GET {{SystemURL}}/Patient?name=John
```

In case of no Resources found, Resource Bundle with zero Resources is returned:

```

{
  "resourceType": "Bundle",
  "type": "searchset",
  "total": 0,
  "link": [
    {
      "relation": "self",
      "url": "/Patient?name= John&_page=1"
    },
    {
      "relation": "first",
      "url": "/Patient?name= John&_page=1"
    },
    {
      "relation": "last",
      "url": "/Patient?name= John&_page=1"
    }
  ]
}

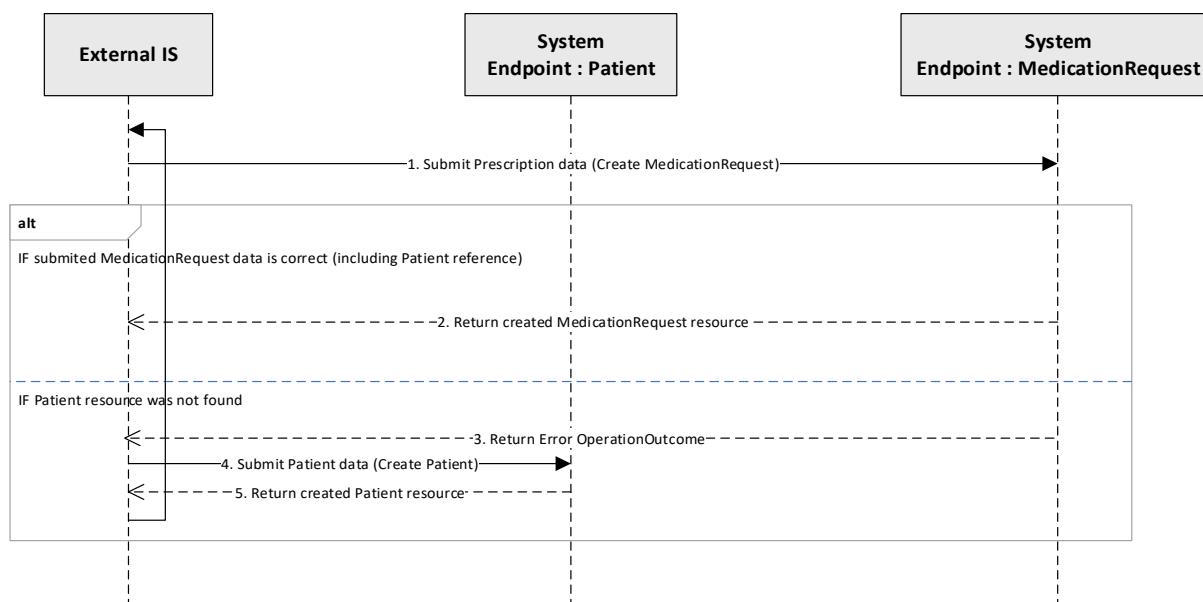
```

**Fig.9 Empty Response to a Multiple resource request**

### 3 CREATE EPRESCRIPTION (MEDICATIONREQUEST)

To create an ePrescription, following Integration Scenario must be executed by the External IS.

#### 3.1 INTEGRATION SCENARIO



**Fig. 10 Create ePrescription integration scenario**

#### 3.1.1 Create Prescription

External IS submits POST request to the System’s MedicationRequest endpoint:

```

-- Submit data required to create a new MedicationRequest Resource:

POST {{SystemURL}}/MedicationRequest
  
```

MedicationRequest includes multiple references (links) to other Resources – Patient, Practitioner (Healthcare specialist who prescribed the Medicine), Organization (Healthcare institution, in which Practitioner works), Medication.

Note, that to reference other Resources, usage of “real life” identifiers, such as Emirates ID or Practitioner license number, is possible. In this case, reference is described via “?identifier=[value]” tag. Another option is to use

System Resource FHIR id, in which case reference is described via “/[value]” syntax.

The Dosage structure defines general dosage instruction information typically represented in medication requests, medication dispenses. Note that dose quantity of the specified medication can have the unit in “Tablets” or “Milligram”, For example, a physician can prescribe a medication of “2 mg”, where mg is unit and 2 is value.

Simple dosage timing instructions can be described using frequency and period. The combination of frequency and period allows for the two commonly used expressions of “X times a period” and “every X period”.

The unit of the period must be one of the period units; s = second; min = minute; h = hour; d =day; wk = week; mo =month; a = year.

Example Body content of the POST request if a physician prescribes by dosage and frequency:

```
{
  "resourceType": "MedicationRequest",
  "intent": "order",
  "status": "active",
  "subject": {
    "reference": "Patient?identifier=784197012345671",
    "display": "Mohammed Khan"
  },
  "authoredOn": "2018-10-04T14:54:07.41+04:00",
  "requester": {
    "agent": {
      "reference": "Practitioner?identifier=GN00000",
      "display": "Test ABDULAH"
    },
    "onBehalfOf": {
      "reference": "Organization?identifier=PFG76876",
      "display": "TEST MEDICAL CENTER"
    }
  },
  "reasonCode": [
    {
      "coding": [
```

```

    {
      "code": "H02.234",
      "system": "http://hl7.org/fhir/sid/icd-10"
    },
    {
      "code": "principal",
      "system": "http://hl7.org/fhir/ex-diagnostype"
    }
  ]
},
{
  "coding": [
    {
      "code": "I69.334",
      "system": "http://hl7.org/fhir/sid/icd-10"
    },
    {
      "code": "differential",
      "system": "http://hl7.org/fhir/ex-diagnostype"
    }
  ]
}
],
"dispenseRequest": {
  "validityPeriod": {
    "end": "2018-10-06T14:54:07.41+04:00",
    "start": "2018-10-04T14:54:07.41+04:00"
  },
  "expectedSupplyDuration": {
    "unit": "days",
    "value": 5
  },
  "numberOfRepeatsAllowed": 1
},
"dosageInstruction": [
  {
    "patientInstruction": "One tablet every 4 hours",
    "route": {

```

```

        "text": "Oral Route"
      },
      "doseQuantity": {
        "unit": "mg",
        "value": 2
      },
      "timing": {
        "repeat": {
          "frequency": 2,
          "period": 1,
          "periodUnit": "d"
        }
      }
    ],
    "medicationReference": {
      "reference": "Medication?code=A40-3594-00112-01"
    },
    "supportingInformation" : [
      {
        "reference" : "Media/8645"
      }
    ]
  }

```

**Fig. 11.1 MedicationRequest example**

Example Body content of the POST request if a physician prescribes in number of tablets:

```

{
  "resourceType": "MedicationRequest",
  "intent": "order",
  "status": "active",
  "subject": {
    "reference": "Patient?identifier=784197012345671",
    "display": "Mohammed Khan"
  },
  "authoredOn": "2018-10-04T14:54:07.41+04:00",

```

```

"requester": {
  "agent": {
    "reference": "Practitioner?identifier=GN00000",
    "display": "Test ABDULAH"
  },
  "onBehalfOf": {
    "reference": "Organization?identifier=PF1147",
    "display": "TEST MEDICAL CENTER"
  }
},
"reasonCode": [
  {
    "coding": [
      {
        "code": "H02.234",
        "system": "http://hl7.org/fhir/sid/icd-10"
      },
      {
        "code": "principal",
        "system": "http://hl7.org/fhir/ex-diagnosisistype"
      }
    ]
  },
  {
    "coding": [
      {
        "code": "I69.334",
        "system": "http://hl7.org/fhir/sid/icd-10"
      },
      {
        "code": "differential",
        "system": "http://hl7.org/fhir/ex-diagnosisistype"
      }
    ]
  }
],
"dispenseRequest": {
  "quantity": {

```



```

    "value": 30,
    "unit": "Tablets"

  },
  "validityPeriod": {
    "end": "2018-10-06T14:54:07.41+04:00",
    "start": "2018-10-04T14:54:07.41+04:00"
  },
  "expectedSupplyDuration": {
    "unit": "days",
    "value": 5
  },
  "numberOfRepeatsAllowed": 1
},
"dosageInstruction": [
  {
    "patientInstruction": "One tablet every 4 hours",
    "route": {
      "text": "Oral Route"
    }
  }
],
"medicationReference": {
  "reference": "Medication?code=A40-3594-00112-01"
},
"supportingInformation" : [
  {
    "reference" : "Media/8645"
  }
]
}

```

**Fig. 11.2 MedicationRequest example**

In successful case, System returns reference to the newly created MedicationRequest Resource in the response header.

In case of an error, System will return OperationOutcome resource with an error message. For example, if Patient with given identifier was not found, following Operation Outcome will be returned:

```
{
  "resourceType": "OperationOutcome",
  "issue": [
    {
      "severity": "error",
      "code": "business-rule",
      "details": {
        "coding": [
          {
            "code": "RES001"
          }
        ],
        "text": "Patient not found"
      }
    }
  ]
}
```

**Fig. 12 OperationOutcome example**

### 3.1.2 Cancel Prescription

External IS submits POST request to the System's MedicationRequest endpoint:

```
-- Submit data required to Cancel MedicationRequest Resource:
POST {{{SystemURL}}}/MedicationRequest/$cancel
```

Example Body content of the cancel MedicationRequest

```
{
  "resourceType": "Parameters",
  "parameter": [
    {
      "name": "request",
```

```
"valueReference": {
  "reference": "MedicationRequest/18213"
},
{
  "name": "requester",
  "valueReference": {
    "reference": "Practitioner/12"
  },
  {
    "name": "requester",
    "valueReference": {
      "reference": " MedicationRequest/187581"
    }
  }
}
```

### 3.1.3 Create Patient

External IS submits GET request to the System's Patient endpoint:

-- Submit data required to create a new Patient Resource:

```
POST {{SystemURL}}/Patient
```

Example Body content of the POST request:

```
{  "resourceType": "Patient",
  "name": [
    {
      "given": [
        "Abdul"
      ],
      "family": "Hussain"
    }
  ],
  "active": true,
  "gender": "male",
  "telecom": [
```

```

    {
      "use": "work",
      "rank": 1,
      "value": "00123456789",
      "system": "phone"
    },
    {
      "use": "work",
      "rank": 1,
      "value": "abdul.hussain@inhealth.test.ae",
      "system": "email"
    }
  ],
  "birthDate": "2000-02-02",
  "identifier": [
    {
      "use": "official",
      "value": "7840000000000",
      "system": "http://fhir.inhealth.ae/EmiratesId"
    },
    {
      "use": "official",
      "value": "1234AE",
      "system": "http://fhir.inhealth.ae/InternationalIdAndCountry"
    }
  ]
}

```

**Fig. 13 Patient example**

In the response header, System returns reference to the newly created Patient Resource.

**NOTE: The Passport and Country code format should be Passport Number + 2 Digit ISO Country code**

### 3.1.4 Bundle Resource

One common operation performed with resources is to gather a collection of resources into a single instance with containing context. In FHIR this is referred to as "bundling" the resources together.

In the example below, resource bundles are useful when a user wants to create a new e-prescription for a new patient. The new prescription and patient records can be created as a set of resources on the system as a single operation.

```
{
  "resourceType": "Bundle",
  "type": "transaction",
  "entry": [{
    "fullUrl": "test-order-id",
    "resource": {
      "resourceType": "Patient",
      "name": [{
        "given": ["test"],
        "family": "test"
      }
    ],
    "active": true,
    "gender": "female",
    "telecom": [{
      "use": "work",
      "rank": 1,
      "value": "",
      "system": "phone"
    }, {
      "use": "work",
      "rank": 1,
      "value": "",
      "system": "email"
    }
  ],
  "birthDate": "1992-10-09",
  "identifier": [{
    "use": "official",
```

```

        "value": "784198012345678",
        "system":
"http://fhir.inhealth.ae/EmiratesId"
    },
    {
        "use": "official",
        "value": "mrn",
        "system": "http://test.ae/mrn"
    }
]
},
"request": {
    "method": "POST",
    "url": "Patient",
    "ifNoneExist":
"identifier=http://fhir.inhealth.ae/EmiratesId|784198012345678"
}
}, {
    "fullUrl": "test-order-id",
    "resource": {
        "resourceType": "MedicationRequest",
        "identifier": [{
            "use": "official",
            "value": "test-order-id",
            "system": "http://test.ae/orderid"
        }
    ],
    "intent": "order",
    "status": "active",
    "subject": {
        "reference":
"Patient?identifier=http://fhir.inhealth.ae/EmiratesId|784198012345678",
        "display": ""
    },
    "authoredOn": "2018-10-29T13:28:12+04:00",
    "requester": {
        "agent": {
            "reference":
"Practitioner?identifier=ABC123",

```

```

        "display": "test"
      },
      "onBehalfOf": {
        "reference":
"Organization?identifier=123",
        "display": "test"
      }
    },
    "reasonCode": [{
      "coding": [{
        "code": "R45.1",
        "system":
"http://hl7.org/fhir/sid/icd-10"
      }, {
        "code": "principal",
        "system":
"http://hl7.org/fhir/ex-diagnostistype"
      }
    ]
  }
},
"dispenseRequest": {
  "quantity": {
    "unit": "tabs",
    "value": "10"
  },
  "validityPeriod": {
    "end": "2018-11-01T13:27:55+04:00",
    "start": "2018-10-29T13:27:55+04:00"
  },
  "expectedSupplyDuration": {
    "unit": "days",
    "value": "3"
  },
  "numberOfRepeatsAllowed": 0
},
"dosageInstruction": [{

```

```

"patientInstruction": "15 mg Once daily at bedtime",
"route": {
"text": "Oral"}
  },
],
"medicationReference": {
"reference": "Medication?code=03808"
  },
  },
  "request": {
    "method": "POST",
    "url": "MedicationRequest"
  }
}
]
}

```

**Fig. 14 Bundle resource example**

## 4 GET EPRESCRIPTION (MEDICATIONREQUEST)

Search operations traverse through an existing set of resources filtering by parameters supplied to the search operation.

In the simplest case, a search is executed by performing a GET operation in the RESTful framework:

Search operations are executed in one of three defined contexts that control which set of resources are being searched:

A specified resource type: GET [base]/[type]?parameter(s)

All resource types: GET [base]?parameter(s) (parameters common to all types). If the `_type` parameter is included, all other search parameters SHALL be common to all provided types. If `_type` is not included, all parameters SHALL be common to all resource types.

To retrieve list of MedicationRequest, External HIS must submit following GET query with "include" keyword

```

-- Find all Prescriptions GET query with "include" keyword
GET {{SystemURL}}/MedicationRequest?_include=MedicationRequest:medication

```



System returns all the MedicationRequest that includes MedicationRequest:medication:

```
{
  "resourceType": "Bundle",
  "type": "searchset",
  "total": 2,
  "link": [
    {
      "relation": "self",
      "url":
"/MedicationRequest?_include=MedicationRequest:medication&_page=1"
    },
    {
      "relation": "first",
      "url":
"/MedicationRequest?_include=MedicationRequest:medication&_page=1"
    },
  ],
  "entry": [
    {
      "resource": {
        "resourceType": "MedicationRequest",
        "id": "187192",
        "meta": {
          "versionId": "1",
          "lastUpdated": "2019-01-08T04:39:12Z"
        },
        "status": "stopped",
        "intent": "order",
        "medicationReference": {
          "reference": "Medication/12219"
        },
        "subject": {
          "reference": "Patient/187191"
        },
        "authoredOn": "2019-01-08T02:39:11.00+04:00",
        "requester": {
```

```

    "agent": {
      "reference": "Practitioner/183695"
    },
    "onBehalfOf": {
      "reference": "Organization/185613"
    }
  },
  "reasonCode": [
    {
      "coding": [
        {
          "system": "http://hl7.org/fhir/sid/icd-10",
          "code": "C50.812"
        },
        {
          "system": "http://hl7.org/fhir/ex-diagnosistype",
          "code": "principal"
        }
      ]
    }
  ],
  "dispenseRequest": {
    "validityPeriod": {
      "start": "2019-01-08",
      "end": "2019-01-10"
    },
    "numberOfRepeatsAllowed": 0,
    "quantity": {
      "value": 5,
      "unit": "mg"
    },
    "expectedSupplyDuration": {
      "value": 14,
      "unit": "days"
    }
  }
},
"request": {

```

```

    "method": "PUT"
  }
},

{
  "resource": {
    "resourceType": "Medication",
    "id": "12467",
    "meta": {
      "versionId": "17",
      "lastUpdated": "2019-01-30T00:19:35Z"
    },
    "code": {
      "coding": [
        {
          "system":
"http://fhir.inhealth.ae/AbuDhabiActiveIngredientCode",
          "code": "03808",
          "display": "Midazolam 15mg Tablet"
        },
        {
          "system": "http://fhir.inhealth.ae/DrugGroup",
          "code": "0",
          "display": "0"
        },
        {
          "system": "http://fhir.inhealth.ae/DubaiActiveIngredientCode",
          "code": "168601-117",
          "display": "Midazolam 15mg Tablet"
        }
      ]
    },
    "status": "active",
    "form": {
      "coding": [
        {
          "system": "http://hl7.org/fhir/ValueSet/medication-form-
codes",

```

```

        "display": "Tablet"
      }
    ]
  },
  "ingredient": [
    {
      "itemCodeableConcept": {
        "coding": [
          {
            "system": "http://fhir.inhealth.ae/ActiveIngredients",
            "code": "Midazolam",
            "display": "Midazolam"
          },
          {
            "system": "http://fhir.inhealth.ae/DispensingMode",
            "code": "CM",
            "display": "Controlled Drug-CD"
          }
        ]
      },
      "isActive": true,
      "amount": {
        "numerator": {
          "value": 15,
          "unit": "mg",
          "system": "http://hl7.org/fhir/ValueSet/ucum-units",
          "code": "mg"
        },
        "denominator": {
          "value": 1
        }
      }
    }
  ],
  "search": {
    "mode": "include"
  },
}

```

```

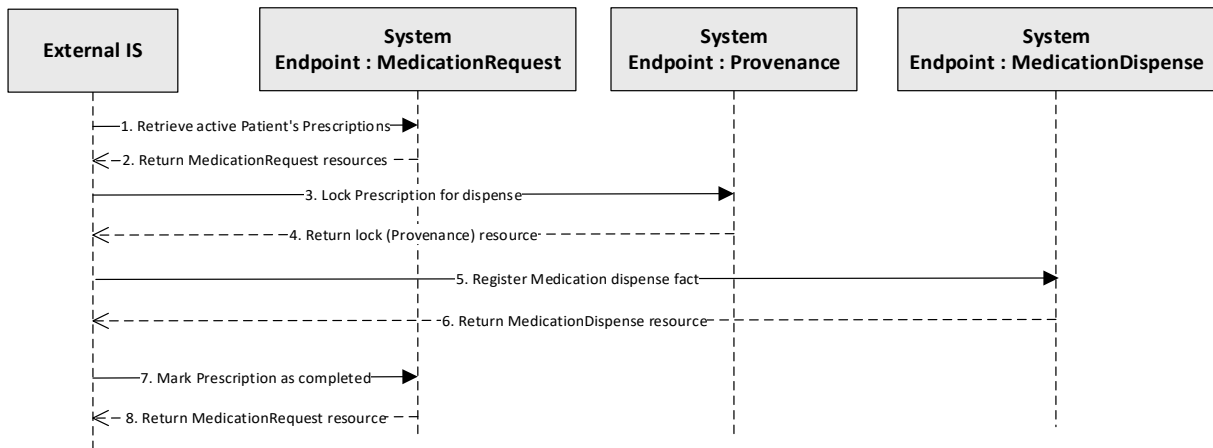
"request": {
  "method": "PUT"
}
]
}

```

**Fig. 15 Example of the Response containing MedicationRequest that "Include"**

## 5 DISPENSE MEDICATION INTEGRATION SCENARIO (MEDICATIONDISPENSE)

### 5.1 INTEGRATION SCENARIO



**Fig. 16 Create MedicationDispense integration scenario**

### 5.1.1 Retrieve ePrescriptions

To retrieve list of Patient’s active ePrescriptions, External HIS must submit following GET query with the patients EmiratesId or Passport and Issuing country:

```
-- Find all active Prescriptions issued to Patient with Emirates ID
784197012345671:

GET
{{SystemURL}}/MedicationRequest?subject:Patient.identifier=7840000
000000 &status=active
```

```
-- Find all active Prescriptions issued to Patient with Passport and issuing
country PD1234AE :

GET    {{SystemURL}}/MedicationRequest?subject:Patient.identifier=
PD1234AE&status=active
```

System returns all the Prescriptions in the Resource Bundle:

```
{
  "resourceType": "Bundle",
  "type": "searchset",
  "total": 1,
  "link": [
    {
      "relation": "self",
      "url":
"/MedicationRequest?subject:Patient.identifier=784197012345671&stat
us=active&_page=1"
    },
    {
      "relation": "first",
      "url":
"/MedicationRequest?subject:Patient.identifier=784197012345671&stat
us=active&_page=1"
    },
    {
      "relation": "last",
      "url":
"/MedicationRequest?subject:Patient.identifier=784197012345671&stat
us=active&_page=1"
    }
  ]
}
```

```

],
"entry": [
  {
    "resource": {
      "resourceType": "MedicationRequest",
      "id": "222503",
      "status": "active",
      "intent": "order",
      "medicationReference": {
        "reference": "Medication/12012"
      },
    },
    "subject": {
      "reference": "Patient/8812",
      "display": "Mohammed Khan"
    },
    "supportingInformation": [
      {
        "reference": "Media/8645"
      }
    ],
    "authoredOn": "2018-10-04T14:54:07.41+04:00",
    "requester": {
      "agent": {
        "reference": "Practitioner/8625",
        "display": "Test ABDULAH"
      },
      "onBehalfOf": {
        "reference": "Organization/9177",
        "display": "TEST MEDICAL CENTER"
      }
    },
    "reasonCode": [
      {
        "coding": [
          {
            "system": "http://hl7.org/fhir/sid/icd-10",
            "code": "H02.234"
          }
        ]
      }
    ]
  }
]

```

```

        {
          "system": "http://hl7.org/fhir/ex-diagnostype",
          "code": "principal"
        }
      ]
    },
    {
      "coding": [
        {
          "system": "http://hl7.org/fhir/sid/icd-10",
          "code": "I69.334"
        },
        {
          "system": "http://hl7.org/fhir/ex-diagnostype",
          "code": "differential"
        }
      ]
    }
  ],
  "dosageInstruction": [
    {
      "patientInstruction": "One tablet every 4 hours",
      "timing": {
        "repeat": {
          "frequency": 2,
          "period": 1,
          "periodUnit": "d"
        }
      },
      "route": {
        "text": "Oral Route"
      },
      "doseQuantity": {
        "value": 2,
        "unit": "mg"
      }
    }
  ],

```



```

    "dispenseRequest": {
      "validityPeriod": {
        "start": "2018-10-04T14:54:07.41+04:00",
        "end": "2018-10-06T14:54:07.41+04:00"
      },
      "numberOfRepeatsAllowed": 1,
      "quantity": {
        "value": 20,
        "unit": "mg"
      },
      "expectedSupplyDuration": {
        "value": 5,
        "unit": "days"
      }
    },
    "request": {
      "method": "POST"
    }
  ]
}

```

**Fig. 17 Example of the Response containing MedicationRequest Resource Bundle**

**NOTE: Providers can perform testing excluding "RouteOfAdministration" since its not a mandatory field.**

## 5.1.2 Lock the Prescription

To ensure that no Practitioner will simultaneously edit the Prescription while Pharmacist is dispensing medicine, External IS puts a lock on the Prescription by submitting POST request to the System's Provenance endpoint:

```
-- Submit data required to create a new Provenance Resource:
POST {{SystemURL}}/Provenance
```

Lock (Provenance) will also ensure that any other Pharmacist cannot simultaneously dispense this Prescription.

```
{
  "resourceType": "Provenance",
  "target": [
    {
      "reference": "MedicationRequest/8415"
    }
  ],
  "recorded": "2018-02-15T08:00:00+02:00",
  "period": {
    "start": "2018-02-15T08:00:00+02:00",
    "end": "2018-02-15T09:00:00+02:00"
  },
  "agent": [
    {
      "whoReference": {
        "reference": "Practitioner?identifier=DHA-P-12319831"
      },
      "onBehalfOfReference": {
        "reference": "Organization?identifier=PF0000"
      }
    }
  ]
}
```

**Fig.18 Provenance example**

### 5.1.3 Dispense Medication

External IS submits POST request to the System's MedicationDispense endpoint:

```
-- Submit data required to create a new MedicationDispense Resource:

POST {{SystemURL}}/MedicationDispense
```

Similarly, to MedicationRequest, MedicationDispense includes multiple references (links) to other Resources.

```
{
  "resourceType": "MedicationDispense",
  "whenHandedOver": "2018-01-21T16:30:07.41+04:00",
  "medicationReference": {
    "reference": "Medication?code=1338-1001-001"
  },
  "authorizingPrescription": [
    {
      "reference": "MedicationRequest/8370"
    }
  ],
  "note": [
    {
      "text": "One tablet every day before the sleep."
    }
  ],
  "status": "completed",
  "subject": {
    "display": "Abdul Hussain",
    "reference": "Patient?identifier=7840000000000"
  },
  "quantity": {
    "unit": "tablet",
    "value": 30
  },
  "receiver": [
```

```

{
  "display": "Mohammed Khan",
  "reference": "Patient?identifier=7840000000001"
}
],
"performer": [
  {
    "actor": {
      "display": "Dr Pharm",
      "reference": "Practitioner?identifier=PS1001"
    },
    "onBehalfOf": {
      "display": "Pharmacy Center UAE",
      "reference": "Organization?identifier=PH2001"
    }
  }
],
"daysSupply": {
  "unit": "days",
  "value": 30
},
"identifier": [
  {
    "use": "official",
    "value": "MD12345689",
    "system": "http://externalsystem/erxdispensesequance"
  }
]
}

```

**Fig. 19 Example of the MedicationDispense request**

In case of successful MedicationDispense request, System will return reference to the created MedicationDispense Resource and the System will update linked MedicationRequest marking it as completed.

### 5.1.4 Mark Prescription as dispensed

Medication Prescription “completed” status indicates that a medication product has been dispensed for a named person/patient. The dispensed status will be automated by the system based on the pharmacy dispenses. The system will mark the status as “completed” only after all the dispenses are done successfully.

**For Example:**

A prescription is created with Quantity: 24 Tablet, Duration: 12 days and Strength: 50 mg.

The prescription will be automatically marked as “completed”, If pharmacist dispensed all the medications prescribed.

**NOTE:** In case any refills are skipped, the prescription automatically expires.

### 5.1.5 Cancel Dispensed Prescription

External IS submits POST request to the System’s MedicationDispense endpoint:

```
-- Submit data required to create a new MedicationDispense Resource:

POST {{SystemURL}}/ MedicationDispense/$cancel
```

Example Body content of the cancel MedicationDispense

```
{
  "resourceType": "Parameters",
  "parameter": [
    {
      "name": "dispense",
      "valueReference": {
        "reference":
"MedicationDispense/187582"
      }
    },
    {
      "name": "dispense",
      "valueReference": {
```

```

"MedicationDispense/187581"
    },
    {
        "name": "performer",
        "valueReference": {
            "reference":
"Practitioner?identifier=GP00987774"
        }
    }
}
    ]}

```

## 6 GET EPRESCRIPTION (MEDICATIONDISPENSE)

Search operations traverse through an existing set of resources filtering by parameters supplied to the search operation.

In the simplest case, a search is executed by performing a GET operation in the RESTful framework:

Search operations are executed in one of three defined contexts that control which set of resources are being searched:

- A specified resource type: GET [base]/[type]?parameter(s)
- A specified compartment, perhaps with a specified resource type in that compartment: GET [base]/Patient/[id]/[type]?parameter(s)
- All resource types: GET [base]?parameter(s) (parameters common to all types). If the \_type parameter is included, all other search parameters SHALL be common to all provided types. If \_type is not included, all parameters SHALL be common to all resource types.

To retrieve list of MedicationDispense, External HIS must submit following GET query with “\_revinclude”

```

-- Find all Prescriptions GET query with “_revinclude” keyword

GET{SystemURL}}//MedicationRequest?subject:Patient.identifier=55AF&_revinclude=MedicationDispense:prescription

```

System returns all the MedicationDispense that \_revincludes MedicationDispense: prescription

```

{
  "resourceType": "Bundle",
  "type": "searchset",
  "total": 2,
  "link": [
    {
      "relation": "self",
      "url":
"/MedicationRequest?subject:Patient.identifier=55AF&_revinclude=MedicationDispense:prescription&_page=1"
    },
    {
      "relation": "first",
      "url":
"/MedicationRequest?subject:Patient.identifier=55AF&_revinclude=MedicationDispense:prescription&_page=1"
    },
  ],
  "entry": [
    {
      "resource": {
        "resourceType": "MedicationRequest",
        "id": "129138",
        "meta": {
          "versionId": "1",
          "lastUpdated": "2018-11-06T11:25:47Z"
        },
        "groupIdentifier": {
          "use": "official",
          "system": "urn:ietf:rhc:3986",
          "value": "8fe750cf-157b-444b-b497-b5f71e29eae0"
        },
        "status": "stopped",
        "intent": "order",
        "medicationReference": {
          "reference": "Medication/12177"
        },
        "subject": {
          "reference": "Patient/129137"
        },
      },
    }
  ]
}

```

```

"authoredOn": "2018-11-06T15:25:43.4157+04:00",
"requester": {
  "agent": {
    "reference": "Practitioner/14",
    "display": "BONY BOMAN SARALA"
  },
  "onBehalfOf": {
    "reference": "Organization/9177",
    "display": "AL ATTAR PHARMACY TEST"
  }
},
"reasonCode": [
  {
    "coding": [
      {
        "system": "http://hl7.org/fhir/sid/icd-10",
        "code": "I70.235"
      },
      {
        "system": "http://hl7.org/fhir/ex-diagnostistype",
        "code": "differential"
      }
    ]
  },
  {
    "coding": [
      {
        "system": "http://hl7.org/fhir/sid/icd-10",
        "code": "S06.354D"
      },
      {
        "system": "http://hl7.org/fhir/ex-diagnostistype",
        "code": "differential"
      }
    ]
  },
  {
    "coding": [

```



```

        {
          "system": "http://hl7.org/fhir/sid/icd-10",
          "code": "H40.1234"
        },
        {
          "system": "http://hl7.org/fhir/ex-diagnosisistype",
          "code": "principal"
        }
      ]
    },
    "dosageInstruction": [
      {
        "route": {
          "text": "Oral Route"
        }
      }
    ],
    "dispenseRequest": {
      "validityPeriod": {
        "start": "2018-11-06T15:25:43.4134+04:00",
        "end": "2018-11-09T15:25:43.4134+04:00"
      },
      "numberOfRepeatsAllowed": 0,
      "quantity": {
        "value": 4,
        "unit": "tablet"
      },
      "expectedSupplyDuration": {
        "value": 4,
        "unit": "days"
      }
    }
  },
  "request": {
    "method": "PUT"
  }
}, {

```

```

"resource": {
  "resourceType": "MedicationDispense",
  "id": "187582",
  "meta": {
    "versionId": "1",
    "lastUpdated": "2019-01-10T10:25:45Z"
  },
  "extension": [
    {
      "url": "Payee",
      "valueString": "Insurer"
    }
  ],
  "status": "entered-in-error",
  "medicationReference": {
    "reference": "Medication/12012"
  },
  "subject": {
    "reference": "Patient/186744",
    "display": "Test7 Test7"
  },
  "performer": [
    {
      "actor": {
        "reference": "Practitioner/49008",
        "display": "PHARMACIST SYSTESTWILLOW"
      },
      "onBehalfOf": {
        "reference": "Organization/185613",
        "display": "TEST MEDICAL CENTER"
      }
    }
  ],
  "authorizingPrescription": [
    {
      "reference": "MedicationRequest/187576"
    }
  ],

```

```

"quantity": {
  "value": 10,
  "unit": "tablet"
},
"daysSupply": {
  "value": 5,
  "unit": "day"
},
"whenHandedOver": "2019-01-10T14:25:44.767+04:00",
"receiver": [
  {
    "reference": "Patient/186744",
    "display": "Test7 Test7"
  }
],
"note": [
  {
    "text": "Patient collected the medication successfully."
  }
]
},
"search": {
  "mode": "include"
},
"request": {
  "method": "PUT"
}
} ]}

```

**Fig. 20 Example of the Response containing MedicationDispense that “\_revInclude”**

## 7 INTEGRATION ENDPOINT REQUEST ERRORS

Possible Error codes that can be returned as a response to the GET/POST/PUT requests to the integration points are described below:

**Table 2: HTTP errors that the System returns**

Request Type	Response Error code	Response Error Message	Description
GET	404	Resource Not Found	This error is returned when GET request is performed for a non-existing resource (i.e., incorrect resource identifier or version number).
GET	500	Server Error	This error is returned when GET request contains incorrect search parameters. Incorrect parameter is then described in the error message. I.e., field "dummy" does not exist in Patient.
POST	400	Bad Request - Failed to	This error is returned when provided Resource does not conform to the required FHIR resource structure (i.e., errors in XML formatting etc.).

## 8 NOTIFICATION CODES AND DESCRIPTION:

During the e-prescription process of prescribing and dispensing the user might receive notification code when perform any specific action. A file is attached which contains the notification codes and their description in the integration document kit namely "**Notification Codes and Description.pdf**". The notification codes consists of technical and medical codes.

## 9 CLINICIAN LICENSE NUMBER AND DRUG CODES

The platform allows all the clinicians and facilities to prescribe who are licensed under DHA(Dubai Health Authority,) DOH(Department of Health , Abu Dhabi) or MOHAP-(Ministry of Health and Prevention for all northern Emirates). The platform also supports the standardize drug code from DOH and DHA.

## 10 OVERRIDING REQUESTS

During the e-prescription prescribing process various drugs and dosage checks will be required and performed taking into consideration the patient's-controlled medication history. Following are the scenarios where physician can override the checks and can submit the prescription provided with overridden reason or comments:

- **Service/supply may be appropriate, but too frequent**
- **Generic of prescribed Drug is not consistent with Diagnosis**