# Assuta-Datos
# Patient & AllergyIntolerance FHIR API

## FHIR-4.01 API

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# 0 Track Changes

Version 4:

- Fixed missing Patient.address.line
- Changed extension URL in OperationOutcome.issue.extension
- Removed code 400 from OperationOutcome error codes

Version 5:

- Fixed URI's from health.**org**.il to health.**gov**.il

Version 6:

- Added Issues & Decisions
- Added gap analysis against US-Core & IL-Core

Version 7:

- Changed search by identifier to search by id

Version 8:

- Combined AllergyIntolerance into this Patient document
- Added search syntax for including AllegyIntolerance resources in the search result bundle (2.1.3)
- Updated the description and notes of Bundle.total and Bundle.entry.search.mode, and updated the example accordingly (4.1)
- Added a full bundle example (4.5)

# 1 URI's

About NamingSystem/CodeSystem URI's:

The naming system / code system URI is a URI/URL that identifies the namespace that makes the identifier or code value unique.
When using a local identifier, such as an Assuta-issued synthetic patient ID (Tafnit encounter ID), a defined and agreed upon namespace URI should be used. This could be a URL-like URI such as http://fhir.assuta.co.il/identifier/tafnit-mrn that does not resolve at all. It is recommended that this URL be made resolvable some time in future, preferably to some human readable description of the naming system, but this is not mandatory.

External business identifiers should have their own URI's published by their issuing authority, by the Israeli Ministry of Health, or by HL7 itself.

Assuta SHALL make sure that any identifier marked as an Israeli ID number really is an Israeli Id number, and not a synthetic ID number generated for special purposes (e.g. tourists).

**Important: To be conformant to the Israeli-Core-Patient profile, an Israeli ID number needs to be an exactly 9-digits long string, where the last (rightmost) digit is a check-digit calculated from the first 8 digits.**

| הערות | URI | מערכת קידוד \ מערכת זיהוי \ Extension |
|---|---|---|
| 9 ספרות עם אפסים מובילים Not Used | http://fhir.health.gov.il/identifier/il-national-id | ת.ז. ישראלית |
| Not Used | http://fhir.health.gov.il /identifier/pna-national-id | ת.ז. פלסטינאית |
| [xxx] הוא קוד המדינה לפי ISO- 3166 (3 תווים) Not Used | http://hl7.org/fhir/sid/passport-*[xxx]* | מספר דרכון |
| | http://fhir.assuta.co.il/identifier/tafnit-mrn | מזוהה מטופל תפנית |
| כאשר משתמשים ב-UUID כמזהה, יש לכלול את הקידומת urn:uuid:. דוגמא: urn:uuid:0c3151bd-1cbf-4d64-b04d-cd9187a4c6e0 | urn:ietf:rfc:3986 | UUID |
| Assuta | http://fhir.assuta.co.il/cs/search-error | קודי שגיאה |
| Outburn | http://fhir.outburn.co.il/StructureDefinition/issue-regards | Extension לחיווי מזהה המטופל שלגביו הוחזרה שגיאה |
| Assuta | http://fhir.assuta.co.il/cs/chameleon-medication-code | Chemeleon Medication Code |
| Assuta | http://fhir.assuta.co.il/cs/chameleon-allergy-code | Chemeleon Allergy Code |
| HL7 | http://terminology.hl7.org/CodeSystem/allergyintolerance-clinical | AllergyIntolerance Clinical Status |
| Assuta | http://fhir.assuta.co.il/identifier/chameleon-user-id | Chameleon User ID |
| Assuta | http://fhir.assuta.co.il/identifier/allergy-intolerance | Chameleon AllergyIntolerance ID |
| Assuta | http://fhir.assuta.co.il/cs/chameleon-allergy-reaction-code | Chemeleon Allergy reaction code |

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# 2  Operations

The operations described in this document are standard HL7® FHIR® R4 search operations. The implementation will be conformant to the [FHIR http framework](), but limited only to:

1. FHIR version 4.0.1
2. JSON format
3. Patient, AllergyIntolerance, OperationOutcome & Bundle resources
4. Search operations on Patient level with:
   a. _id search parameter
   b. _include search parameter, limited only to AllergyIntolerance resources

These capabilities are just a limited set of the FHIR standard, but when implemented successfully can be regarded as a conformant implementation. Both client and server (Datos and Assuta, respectively) CAN AND SHOULD further extend their capabilities in the future to support additional resources, operations, formats & versions.

## 2.1  Search Patient

To Implement the necessary search operations, Assuta will expose an HTTP endpoint that will serve as the "FHIR server".
Datos (the "client") will query this endpoint according to the FHIR API syntax.

The HTTP endpoint will be referenced as *BaseURL* in this specification.
The BaseURL can be a specific endpoint just for Datos, or a general endpoint that will serve other FHIR clients in the future.

This is an important consideration, as the policy for handling logical resource ID's is affected by this – E.g, using the Tafnit encounter ID as the logical ID of the (virtual) Encounter resource would mean these ID's could never be re-used or changed when other source systems in Assuta wish to expose encounters.

If Tafnit has an encounter with id 123, another system could never have an encounter with the logical ID 123 *under the same endpoint*.
These issues can be solved in the future by adding a prefix to the ID's of any new data source, or by using UUID's, or by using a separate server endpoint address.

The operations described in this document SHALL all be regarded as search operations and as such:

- They may return more than one resource that match the criteria, even when only one encounter/patient ID is requested (not necessarily with Assuta, but with other "servers" it could happen)
- They may return zero resources, and this is NOT regarded as an error
- They will always return a Bundle resource with zero or more Patient resources nested inside it (as opposed to just returning a Patient resource by itself)

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### 2.1.1  Search for a single Patient by logical id:
GET [BaseURL]/Patient?_id=[patient logical id]

Example:
GET https://fhir.assuta.co.il/Patient?_id=c6762d81-c28d-4cbb-8545-3aa9ba005d8c
In this example, the client asks for the patient resource that has a logical id (resource.id) of *c6762d81-c28d-4cbb-8545-3aa9ba005d8c*.

### 2.1.2  Multiple id's
GET [BaseURL]/Patient?_id=[logical id 1],[logical id 2],[logical id 3]

Example:
GET https://fhir.assuta.co.il/Patient?_id=c6762d81-c28d-4cbb-8545-3aa9ba005d8c,0d2e13a2-964d-4e34-9834-96d4b6e682ba,f3b7d766-823a-4a3e-9a74-9585944c57ea

In this example, the client asks for patients that have the logical id (resource.id) *c6762d81-c28d-4cbb-8545-3aa9ba005d8c* **or** *0d2e13a2-964d-4e34-9834-96d4b6e682ba* **or** *f3b7d766-823a-4a3e-9a74-9585944c57ea*

### 2.1.3  Including AllergyIntolerance
GET [BaseURL]/Patient?_id=[logical id]&_revinclude=AllergyIntolerance:patient

Example:

GET https://fhir.assuta.co.il/Patient?_id=c6762d81-c28d-4cbb-8545-3aa9ba005d8c&_revinclude=AllergyIntolerance:patient

In this example, the client asks for the patient resource that has the logical id (resource.id) *c6762d81-c28d-4cbb-8545-3aa9ba005d8c* AND any AllergyIntolerance resources that reference that same patient with the AllergyIntolerance.patient element.


# 3  Headers
In any HTTP request the client should pass a Content-Type header parameter with the following value: "application/fhir+json; fhirVersion=4.0".

In addition, an authorization parameter shall be included. Example:

Authorization: Basic TW92ZW90ZXN0VXNlcjpBYjEyMzQ=


# 4  Body
In search operations, the server returns a Bundle resource containing the patient resource(s) that match the search query. This is also true for e.g. a search by an a single encounter's logical ID, even though this search will never return more than one resource.

The structure of the Resources is based on FHIR® Release 4 (v4.0.1) and in JSON format. Other formats (such as XML) and versions (STU3, DSTU2) may be supported if Assuta and/or Datos choose to – but these capabilities are not described in this document.

## 4.1  Search response (Bundle resource)

| Element name | Cardinality | Type | Value | Notes |
|---|---|---|---|---|
| resourceType | 1..1 | string | fixed: "Bundle" | |
| id | 1..1 | string | UUID | A unique UUID per response |
| type | 1..1 | string | fixed: "searchset" | |
| total | 1..1 | number | total number of **matched** resources | This is the count of the entries that matched the query. In this scenario this will always be the number of Patient resources returned. The total SHALL NOT include the count of AllergyIntolerance and/or OperationOutcome resources! |
| entry | 0..* | Object | | A container for a resource |
| entry.fullUrl | 0..1 | string | [BaseURL]/Patient/[LogicalID] | This is the full absolute URL of the patient resource. For OperationOutcome resources, there's no need to populate this field. |
| entry.resource | 1..1 | Object | | The actual Patient or OperationOutcome resource |
| entry.search | 1..1 | Object | | information about the relationship between the search criteria and this resource |
| entry.search.mode | 1..1 | string | match | outcome | include | Since the search is on the Patient level – only Patient resources will have a "match" value in this element. When an OperationOutcome is included in the bundle, its |

| | | | | mode SHALL be "outcome". If an AllergyIntolerance resource is included in the results, its mode SHALL be "include" |
|---|---|---|---|---|
| | | | | |

Example:

```
{
    "resourceType": "Bundle",
    "id": "ff5a1b38-c3c1-4c40-91d2-b9831ebfdc25",
    "type": "searchset",
    "total": 2,
    "entry": [
        {
            "fullUrl": "https://fhir.assuta.co.il/Patient/601c05c9-bf16-4962-ac46-3eeacab9fd58",
            "resource": {  -- Patient resource, snipped for brevity -- },
            "search": {
                "mode": "match"
            }
        },{
            "fullUrl": "https://fhir.assuta.o.il/Patient/120fdb8b-08a6-4e8a-9749-399e9b06f5fd",
            "resource": {  -- Patient resource, snipped for brevity -- },
            "search": {
                "mode": "match"
            },{
            "resource": {  -- OperationOutcome resource, snipped for brevity -- },
            "search": {
                "mode": "outcome"
            },{
            "fullUrl": "https://fhir.assuta.o.il/AllergyIntolerance/123456.974939",
            "resource": {  -- AllergyIntolerance resource, snipped for brevity -- },
            "search": {
                "mode": "include"
            }
        }
    ]
}
```

## 4.2   The Patient resource

| Element name | Cardinality | Type | Value | Notes |
|---|---|---|---|---|
| resourceType | 1..1 | string | fixed: "Patient" | |
| id | 1..1 | string | The logical ID of the resource | A patient specific UUID |
| identifier | 0..* | Object | | |

| | | | | |
|---|---|---|---|---|
| identifier.system | 0..1 | string | | A URI that acts as a namespace for the identifier values |
| identifier.value | 0..1 | string | The identifier value | Shall be unique within the namespace |
| active | 0..1 | boolean | | Whether this patient's record is in active use |
| name | 0..* | Object | | |
| name.family | 0..1 | string | | |
| name.given | 0..* | string | | |
| telecom | 0..* | Object | | |
| telecom.system | 0..1 | string | fixed: "phone" | |
| telecom.use | 0..1 | string | mobile \| home | |
| telecom.value | 0..1 | string | +972xxxxxxxxx | The mobile or home phone number, corresponding to the value of telecom.use |
| gender | 0..1 | string | male \| female \| other \| unknown | |
| birthDate | 0..1 | string | | YYYY-MM-DD |
| address | 0..* | Object | | |
| address.city | 0..1 | string | | |
| address.line | 0..* | string | | address line (street and house number) |
| address._line | 0..* | Object | | a container for extensions on address.line |
| address._line.extension | 1..* | Object | | the actual extensions |
| address._line.extension.url | 1..1 | string | | This URL identifies the extension. The defined URL's for street name, house number and apartment are listed below this table |
| address._line.extension.valueString | 0..1 | string | | The street name, house number or apartment, |

| | | | | depending on the value of address._line.extension.url |
|---|---|---|---|---|

**Extension URL's:**

Street name: http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-streetName
House number: http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-houseNumber
Apartment: http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-unitID

**Example:**

```json
{
  "resourceType": "Patient",
  "id": "0c3151bd-1cbf-4d64-b04d-cd9187a4c6e0",
  "identifier": [ {
    "system": "http://fhir.health.gov.il/identifier/il-national-id",
    "value": "000000018"
  },{
    "system": "http://fhir.assuta.co.il/identifier/tafnit-mrn",
    "value": "123456"
  },{
    "system": "urn:ietf:rfc:3986",
    "value": "urn:uuid:0c3151bd-1cbf-4d64-b04d-cd9187a4c6e0"
  } ],
  "active": true,
  "name": [ {
    "family": "דאק",
    "given": [ "דפי" ]
  } ],
  "telecom": [ {
    "system": "phone",
    "use": "mobile",
    "value": "+972509000009"
  }, {
    "system": "phone",
    "use": "home",
    "value": "+97233333333"
  } ],
  "gender": "female",
  "birthDate": "1969-07-16",
  "address": [ {
    "city": "תל-אביב",
    "line": ["אלכסנדר פן 4"],
    "_line": [ {
      "extension": [ {
        "url": "http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-streetName",
        "valueString": "פן אלכסנדר"
      }, {
        "url": "http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-houseNumber",
        "valueString": "4"
      }, {
```

```
            "url": "http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-unitID",
            "valueString": "18"
        } ]
      } ]
    } ]
}
```

## 4.3    AllergyIntolerance resource

| Element name | Cardinality | Type | Value | Notes |
|---|---|---|---|---|
| resourceType | 1..1 | string | "AllergyIntolerance" | fixed value |
| identifier | 0..* | Object | | |
| identifier.system | 1..1 | string | http://fhir.assuta.co.il/identifier/allergy-intolerance | fixed value |
| identifier.value | 1..1 | string | [patient].[Drug] \|  [patient].[Allergy_ID] | |
| clinicalStatus | 1..1 | Object | | |
| clinicalStatus.coding | 1..* | Object | | |
| clinicalStatus.coding.system | 1..1 | string | http://terminology.hl7.org/CodeSystem/allergyintolerance-clinical | |
| clinicalStatus.coding.code | 1..1 | string | active \| inactive \| resolved | |
| type | 0..1 | string | allergy \| intolerance | |
| category | 0..* | string | food \| medication \| environment \| biologic | |
| criticality | 0..1 | string | low \| high \| unable-to-assess | |
| code | 1..1 | Object | | |
| code.coding | 1..* | Object | | |

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| | | | | |
|---|---|---|---|---|
| code.coding.system | 1..1 | string | http://fhir.assuta.co.il/cs/chameleon-medication-code<br><br>OR:<br><br>http://fhir.assuta.co.il/cs/chameleon-allergy-code | Depends on the source of the record (Medication/Allergy) |
| code.coding.code | 1..1 | string | [Drug] \| [Allergy_ID] | Allergy/Medication code |
| code.text | 0..1 | string | [Drug_Name] \| [Allergy_IDText] | Hebrew descrition of the substance |
| patient | 1..1 | Object | | |
| patient.reference | 1..1 | string | Patient/[logical id] | A relative URL pointing at the patient resource |
| recordedDate | 0..1 | string | [Entry_Date] | Format: YYYY-MM-DDTHH:mm:ss.msZ |
| recorder | 0..1 | Object | | |
| recorder.type | 1..1 | string | "Practitioner" | fixed value |
| recorder.identifier | 1..1 | Object | | |
| recorder.identifier.system | 1..1 | string | http://fhir.assuta.co.il/identifier/chameleon-user-id | fixed value |
| recorder.identifier.value | 1..1 | string | [Entry_User] | |
| recorder.display | 0..1 | string | [WritingBy] | Name of the recording user |
| reaction | 0..* | Object | | |
| reaction.manifestation | 1..* | Object | | |
| reaction.manifestation.coding | 0..* | Object | | One of: manifestation.coding, |

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| | | | | manifestation.text MUST be present |
|---|---|---|---|---|
| reaction.manifestation.coding.system | 1..1 | string | http://fhir.assuta.co.il /cs/chameleon-allergy-reaction-code | |
| reaction.manifestation.coding.code | 1..1 | string | [Reaction] | |
| reaction.manifestation.text | 0..1 | string | [Reaction_Text] | One of: manifestation.cod ing, manifestation.text MUST be present |

**Example:**

```
{
  "resourceType": "AllergyIntolerance",
  "id": "126765",
  "identifier": [
    {
      "system": "http://fhir.assuta.co.il/identifier/allergy-intolerance",
      "value": "abc123.1078"
    }
  ],
  "clinicalStatus": {
    "coding": [
      {
        "system": "http://terminology.hl7.org/CodeSystem/allergyintolerance-clinical",
        "code": "active"
      }
    ]
  },
  "type": "allergy",
  "category": [
    "medication"
  ],
  "criticality": "high",
  "code": {
    "coding": [
      {
        "system": "http://fhir.assuta.co.il/cs/chameleon-medication-code",
```

```json
        "code": "10"
      }
    ],
    "text": "AMPICILLIN"
  },
  "patient": {
    "reference": "Patient/45c72d13-f4f8-4292-81d4-b644d41f583f"
  },
  "recordedDate": "2021-11-21T11:08:11.111Z",
  "recorder": {
    "type": "Practitioner",
    "display": "דר משה אופניק",
    "identifier": {
      "system": "http://fhir.assuta.co.il/identifier/chameleon-user-id",
      "value": "12345"
    }
  },
  "reaction": [
    {
      "manifestation": [
        {
          "coding": [
            {
              "system": "http://fhir.assuta.co.il/cs/chameleon-allergy-reaction-code",
              "code": "117"
            }
          ],
          "text": "קשיי נשימה"
        }
      ]
    }
  ]
}
```

## 4.4  OperationOutcome Resource

This resource is used to convey information about issues detected during the search. In this implementation it would be used to report issues about requested patients that where not returned. A dedicated extension will be used to report the missing patients' identifiers.

| Element name | Card. | Type | Value | Notes |
|---|---|---|---|---|
| resourceType | 1..1 | string | fixed: "OperationOutcome" | |
| issue | 1..* | Object | | Array of detected issues |

| | | | | |
|---|---|---|---|---|
| issue.extension | 0..* | Object | | |
| issue.extension.url | 1..1 | string | fixed: http://fhir.outburn.co.il/StructureDefinition/issue-regards | URL identifying the extension |
| issue.extension.valueId | 1..1 | string | | The patient logical id (resource.id) |
| issue.severity | 1..1 | string | warning \| error | Use warning for not-found patients, and error for technical failures |
| issue.code | 1..1 | string | not-found \| exception | Use exception for internal technical failures |
| issue.details | 0..1 | Object | | Specific error text and codings |
| issue.details.coding | 0..* | Object | | Error coding |
| issue.details.coding.system | 1..1 | string | fixed: http://fhir.assuta.co.il/cs/search-error | URI for error code system |
| issue.details.coding.code | 1..1 | string | ENS404 \| ENS502 | Error code |
| issue.details.text | 1..1 | string | | Error description |
| issue.diagnostics | 0..1 | string | | Detailed diagnostic information |

Example:

```
{
  "resourceType": "OperationOutcome",
  "issue": [ {
    "extension": [ {
      "url": "http://fhir.outburn.co.il/StructureDefinition/issue-regards",
      "valueId": "b16c35bd-89cd-4825-9844-f6a5a6ea6609"
    } ],
    "severity": "warning",
    "code": "not-found",
    "details": {
      "coding": [ {
        "system": "http://fhir.assuta.co.il/cs/search-error",
        "code": "ENS404"
      } ],
      "text": "Patient not found"
    }
  } ]
}
```

### 4.4.1 Error Codes

| Http Status | Body Error Code | Error Message |
|---|---|---|
| 200 | ENS404 | Patient Not Found |
| 200 | ENS502 | Connection Error to interface:"Interface Name+Error Description" |

## 4.5 Full Bundle Example

This example shows a full response Bundle that includes one Patient resource, one AllergyIntolerance resource and one OperationOutcome resource. This bundle is the expected result for the following search:

GET [server url]/Patient?_id=123,456&_revinclude=AllergyIntolerance:patient

In business terms, the client asks: "give me the patients with logical id's 123 and 456 and include their allergies", and the server responds only with patient 123 and its allergy, and gives error information regarding why patient 456 was not returned.

**Note that the total equals 1 in this scenario, even though the bundle includes 3 resources – since the total is only the count of the resources that matched the search criteria (the found Patient resource).**

```json
{
  "resourceType": "Bundle",
  "id": "ecd20cf3-de2f-45b7-a82c-c0c50da99777",
  "type": "searchset",
  "total": 1,
  "entry": [
    {
      "fullUrl": "http://hapi-fhir.outburn.co.il/fhir/Patient/123",
      "resource": {
        "resourceType": "Patient",
        "id": "123",
        "identifier": [
          {
            "system": "http://fhir.health.gov.il/identifier/il-national-id",
            "value": "000000018"
          },
          {
            "system": "http://fhir.assuta.co.il/identifier/tafnit-mrn",
            "value": "123456"
          },
          {
            "system": "urn:ietf:rfc:3986",
            "value": "urn:uuid:0c3151bd-1cbf-4d64-b04d-cd9187a4c6e0"
```

```json
          }
        ],
        "active": true,
        "name": [
          {
            "family": "דאק",
            "given": [
              "דפי"
            ]
          }
        ],
        "telecom": [
          {
            "system": "phone",
            "use": "mobile",
            "value": "+972509000009"
          },
          {
            "system": "phone",
            "use": "home",
            "value": "+97233333333"
          }
        ],
        "gender": "female",
        "birthDate": "1969-07-16",
        "address": [
          {
            "city": "תל-אביב",
            "line": [
              "אלכסנדר פן 4"
            ],
            "_line": [
              {
                "extension": [
                  {
                    "url": "http://hl7.org/fhir/StructureDefinition/iso21090-
ADXP-streetName",
                    "valueString": "פן אלכסנדר"
                  },
                  {
                    "url": "http://hl7.org/fhir/StructureDefinition/iso21090-
ADXP-houseNumber",
                    "valueString": "4"
```

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```json
        },
        {
          "url": "http://hl7.org/fhir/StructureDefinition/iso21090-
ADXP-unitID",
          "valueString": "18"
        }
      ]
    }
  ]
}
],
},
"search": {
  "mode": "match"
}
},
{
  "fullUrl": "http://hapi-fhir.outburn.co.il/fhir/AllergyIntolerance/126765",
  "resource": {
    "resourceType": "AllergyIntolerance",
    "id": "126765",
    "identifier": [
      {
        "system": "http://fhir.assuta.co.il/identifier/allergy-intolerance",
        "value": "abc123.1078"
      }
    ],
    "clinicalStatus": {
      "coding": [
        {
          "system":
"http://terminology.hl7.org/CodeSystem/allergyintolerance-clinical",
          "code": "active"
        }
      ]
    },
    "type": "allergy",
    "category": [
      "medication"
    ],
    "criticality": "high",
    "code": {
      "coding": [
```

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```json
        {
          "system": "http://fhir.assuta.co.il/cs/chameleon-medication-code",
          "code": "10"
        }
      ],
      "text": "AMPICILLIN"
    },
    "patient": {
      "reference": "Patient/123"
    },
    "recordedDate": "2021-11-21T11:08:11.111Z",
    "recorder": {
      "type": "Practitioner",
      "display": "דר משה אופניק",
      "identifier": {
        "system": "http://fhir.assuta.co.il/identifier/chameleon-user-id",
        "value": "12345"
      }
    },
    "reaction": [
      {
        "manifestation": [
          {
            "coding": [
              {
                "system": "http://fhir.assuta.co.il/cs/chameleon-allergy-
reaction-code",
                "code": "117"
              }
            ],
            "text": "קשיי נשימה"
          }
        ]
      }
    ]
  },
  "search": {
    "mode": "include"
  }
},
{
  "resource": {
    "resourceType": "OperationOutcome",
```

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```json
    "issue": [
      {
        "extension": [
          {
            "url": "http://fhir.outburn.co.il/StructureDefinition/issue-regards",
            "valueId": "456"
          }
        ],
        "severity": "warning",
        "code": "not-found",
        "details": {
          "coding": [
            {
              "system": "http://fhir.assuta.co.il/cs/search-error",
              "code": "ENS404"
            }
          ],
          "text": "Patient 456 not found"
        }
      }
    ]
    },
    "search": {
      "mode": "outcome"
    }
    }
  ]
}
```

# 5  Mapping

## 5.1  Assuta API to FHIR

| Field | FHIR mapping (Patient resource) | Notes |
|---|---|---|
| usersMap | id | |
| usersMap[AssutaId].FIRST NAME | name[0].given[0] | |
| usersMap[AssutaId].LAST NAME | name[0].family | |
| usersMap[AssutaId].CELL | telecom[0].value | telecom[0].system should be set to "phone" and telecom[0].use should be set to "mobile" |

| | | |
|---|---|---|
| usersMap[AssutaId].ID | identifier[0].value | identifier[0].system should be set to: "http://fhir.health.gov.il /identifier/il-national-id" |
| usersMap[AssutaId].GENDER | gender | values should be converted to lowercase (male, female) |
| usersMap[AssutaId].AGE | f(birthDate) | |
| usersMap[AssutaId].BIRTHDATE | birthDate | |
| usersMap[AssutaId].HOME_PHONE | telecom[1].value | telecom[1].system should be set to "phone" and telecom[1].use should be set to "home" |
| usersMap[AssutaId].CITY | address[0].city | |
| usersMap[AssutaId].STREET | address[0]._line[0].extension[0].valueString | address[0]._line[0].extension[0].url should be set to: http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-streetName |
| usersMap[AssutaId].HOUSE_NO | address[0]._line[0].extension[1].valueString | address[0]._line[0].extension[1].url should be set to: http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-houseNumber |
| usersMap[AssutaId].APARTMENT | address[0]._line[0].extension[2].valueString | address[0]._line[0].extension[2].url should be set to: http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-unitID |

## 5.2   FHIR to Datos

When receiving FHIR resources from external systems there are several issues to consider:

- They may contain elements that do not exist in Datos's internal data model.
- They may be missing some elements that Datos considers mandatory.
- The order of array elements may differ from the order by which they are mapped when creating a FHIR resource from Assuta's data. E.g, mobile and home phones may appear in the reverse order than they are in the example above
- They may contain multiple values for elements that have a maximum cardinality of 1 in Datos's data model (e.g. name.given is an array in FHIR)

These issues require Datos to define a policy for the handling of external resources.

For the first two bullets - A good policy would include profiling the "Assuta patient profile" and using this profile to communicate the constraints inherited from the internal data model. This document does not dive into profiling and does not define the policy.

As for the last two bullets – a conditional mapping logic should be used. E.g, mapping the phone and email according to the value of telecom.system and not according to the index in the array.

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The table below uses a convenient syntax to represent this mapping logic.

| Field Description | FHIR mapping | Notes |
|---|---|---|
| Israeli national ID number | identifier[system=' http://fhir.health.gov.il /identifier/il-national-id'].value | |
| birth date | birthDate | |
| last name | name[use=official OR usual OR missing].family | If multiple array elements satisfy the condition, take the first one |
| first name | name[use=official OR usual OR missing].given[0] | If multiple array elements satisfy the condition, take the first one |
| home phone | telecom[system='phone' and use='home'].value | If multiple array elements satisfy the condition, take the first one |
| cell phone | telecom[system='phone' and use='mobile'].value | If multiple array elements satisfy the condition, take the first one |
| gender | gender | |
| age | calculate according to birthDate & current date | |
| city | address[use='home' OR use.missing].city | If multiple array elements satisfy the condition, take the first one |
| street | address[use='home' OR use.missing]._line[*].extension[url=' http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-streetName'].valueString | If multiple array elements satisfy the condition, take the first one |
| house number | address[use='home' OR use.missing]._line[*].extension[url=' http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-houseNumber'].valueString | If multiple array elements satisfy the condition, take the first one |
| apartment | address[use='home' OR use.missing]._line[*].extension[url=' http://hl7.org/fhir/StructureDefinition/iso21090-ADXP-unitID'].valueString | If multiple array elements satisfy the condition, take the first one |

# 6  HTTP Status Codes

The status code 200 OK should be returned whenever a search operation has been completed successfully, regardless of the number of matching results. A 200 code with an empty search result

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Bundle resource (with a total=0) is the expected response when there is no match, as long as the server has not encountered a technical error that prevents the whole search from being performed.

When the server cannot perform the search operation due to some error, or due to problems processing the input parameters, the response HTTP code should be 5xx/4xx, depending on the type of error.

When a search fails only for specific Patients, a Bundle containing an OperationOutcome resource will be returned.

# 7 Gap Analysis against Cores

## 7.1 US Core

The Patient resource is conformant to the US core Patient profile since:

1. There is at least one identifier
2. There is a name
3. The telecom values have both system and value
4. The gender is populated

## 7.2 Israel Core

The Patient resource is conformant to the IL-core Patient profile since:

1. There is at least one identifier
2. There is a name
3. The telecom values have both system and value
4. The gender is populated
5. The address element is conformant to the ILCoreAddress datatype profile

# 8 Issues & Decisions

| Resource | Element | Issue | Decision | IL-C Acti Req |
|---|---|---|---|---|
| Patient | identifier | The identifier to be used in a patient search is not truly a patient identifier but more of an 'Encounter' identifier, in the FHIR sense. This means it is not 1-1 for a patient | The Tafnit MRN identifier will not be used as a logical id, but it will be used as a patient's business identifier. We have discussed the meaning of this with Assuta (multiple MRN's for the same patient) and this approach was preferred over the other option - searching a patient using reverse chaining with an Encounter resource. | No |

| | | | | |
|---|---|---|---|---|
| | | and therefore cannot be used as a logical id and may also not be good as a patient business identifier. | | |
| Patient | id | There isn't a good candidate for a Patient's logical id in this use case, only a business identifier. | Datos will always fetch patients using a search operation on the identifier element and will not use simple read (get single patient by id). This also means the result will always be a Bundle resource of type 'searchset' with zero or more Patient resources. | No |
| Patient | identifier (search) | Need to search for multiple patients in a single API call | | |
| Bundle | entry | Need a way to supply information about the reason any of the requested patients were not returned, without returning an error for the whole search. This should also be the case when a technical interface error prevents a single patient's demographics from being returned | The standard FHIR search behavior indeed does not treat a not-found patient as an error. The standard also supports the returning of an OperationOutcome resource in the bundle to supply some more information about the performed search. We decided to implement this as a solution. | No |
| OperationOutcome | issue | In addition to an error code for 'not found' and 'interface error', which is supported by the base resource structure (using custom terminology), we | To avoid using a text element and then use string manipulation to extract this information, we decided to use an extension. The 'issue-regards' extension is maintained by Outburn specifically for this use and it's definition is available on simplifier: https://simplifier.net/outburn/issueregards | May |

| | | need a way to determine which patient is the subject of each error. Using the base structure, this can only be achieved using a text element. | The value of the extension will be of type Identifier and it will supply the business identifier as it was requested in the search parameters.<br><br>Canonical URL of the extension: http://fhir.outburn.co.il/StructureDefinition/issue-regards | |
|---|---|---|---|---|
| Patient | id | Need to reference a Patient resource that has been returned. To reference using a URL  there is a need to define a logical id for a patient that will act as the object key. | Assuta will generate a GUID for each patient and return it as the Patient.id. This logical id will only be kept on Datos's side during a session for reference purposes and will not be saved for later use outside of the scope of the session. When Datos will POST Observations and DocumentReferences they will reference the patient using this id.<br>Assuta will keep an internal mapping table to covert between a patient's internal identifier and it's FHIR logical id. | No |
| Patient | address.line | Need to support the current data model for address, including street name, house number and apartment | Re-used the IL-Core references to standard HL7 extensions for street name, house number and apartment. | No |
| AllergyIntolerance | | Need to define a mechanism for the interface. Will Datos ask for the Allergies when they fetch patients? Is it a separate transaction?<br>Are UPDATES / DELETES supported? | Datos will ask the server to include allergies in the Patient search response | |
| AllergyIntolerance | code | One medication code URI for all Assuta sites or separate ones? | Same one | |
| AllergyIntolerance | identifier / id | What fields should comprise the resource | [patient].[Drug] \| [patient].[Allergy_ID] | |

| | | identifier (PK)? Row_ID? Medical_Record? Both? | |
|---|---|---|---|
| AllergyIntolerance | type | Need to define logic to differentiate between allergy and intolerance<mark>, if possible</mark> | |
| AllergyIntolerance | category | Need to define logic to differentiate between food \| medication \| environment \| biologic, <mark>if possible</mark> | |
| AllergyIntolerance | criticality | values must be: low \| high \| unable-to-assess <mark>Should the source field 'degree' be used to map to these?</mark> | |
| AllergyIntolerance | recorder.identifier | Is WritingBy also a User ID like Entry_User or is it some other type of identifier? | The actual table (not the view) has Entry_User also, so it's the same mapping for both sources |
| AllergyIntolerance | patient.reference | The patient's logical id (UUID) should already be assigned before the AllergyIntolerance resource can be generated | |
| AllergyIntolerance | reaction.manifestation | Do both allergy sources have coded reaction codes? And if so, is it the same code system for both medication | |

| | | allergies and other allergies? | | |
| --- | --- | --- | --- | --- |