

EMR Data Migration

Implementation Guide

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1. INTRODUCTION

1.1 PURPOSE

The purpose of this document is to provide conformance statements and guidance to implementers that need to export or import EMR data in the form of XML instances (e.g., XML files) that conform to the EMR Data Migration Schemas. Implementation guidance is provided for each of the categories of data defined in the EMR Data Migration Data Dictionary as well as guidance for aspects of data migration that are not specific to a data category.

EMR vendors are expected to use this document in conjunction with the EMR Data Migration Data Dictionary and the EMR Data Migration Schemas to export or import XML instances. The EMR Data Migration Data Dictionary provides the logical data element names, definitions, field lengths, code sets, and mapping to the corresponding XML element or attribute. The XML Schema describe the relationships between XML elements, cardinality, and if they are mandatory or optional. The EMR Data Migration Implementation Guide bridges those two documents by providing the additional business rules, guidance and other information EMR vendors need to know when exporting or importing patient data using as an XML instance.

1.2 ASSUMPTIONS

Several assumptions were made in the preparation of this document:

- Readers understand the information described in the EMR Data Migration Business View and EMR Data Migration Requirements documents which set the business context and system requirements for EMR data migrations.
- Readers are educated and trained in the use of the XML family of standards.

1.3 IMPLEMENTATION DOCUMENTS

The following documents are used collectively to specify the format of a subset of EMR data that can be migrated from one EMR Offering to another using XML files.

DOCUMENT NAME & VERSION	PUBLICATION DATE	PURPOSE
EMR Data Migration 5.0 - Implementation Guide 1.0	August 4, 2017	Describes conformance constraints and business rules for exporting and importing EMR data that conforms to the EMR Data Migration Schema
EMR Data Migration Data 5.0 - Dictionary 1.0	August 4, 2017	Defines the data elements, their attributes, and corresponding code sets
EMR Data Migration 5.0 - Schema 1.0	August 4, 2017	Defines the structure of the XML instances to be exported or imported by EMR Offerings
EMR Data Migration Schema 5.0 - Data Types 1.0	August 4, 2017	Defines the datatypes inherited by EMR Data Migration Schema

Table 1 – Implementation Documents

1.4 CONFORMANCE VERBS

There are two types of conformance statements conveyed in this document:

1. EMR vendor expectations – used to describe actions or things EMR vendors SHALL/MUST (required/mandatory), SHOULD (best practice/recommendation), or MAY (optional) do. For example, “If the source EMR Offering expresses RefilDuration in a different unit of time (e.g. weeks, months, etc.) then it MUST be converted to the corresponding number of days”.
2. XML element and attribute expectations – used to describe conformance expectations for elements and attributes in the XML instance. For example, “SHALL contain exactly one [1..1] LegalName”

The use of these verbs is described in further detail below.

1.4.1 Verbs Used for EMR vendor Expectations

The following definitions of the conformance verbs are used in this document and were originally provided in the HL7 Version 3 Publishing Facilitator's Guide (<http://www.hl7.org/v3ballot/html/help/pfg/pfg.htm>):

1. SHALL/MUST: Required/Mandatory
2. SHOULD: Best Practice/Recommendation
3. MAY: Acceptable/Permitted

1.4.2 Verbs Used for XML Element and Attribute Expectations

The following are the definitions of the attribute conformance and derived from the Pan-Canadian Implementation Guide volume 0:

- Mandatory (Must Exist) - A valid XML instance must include all mandatory elements and be populated with valid data.
- Optional (May Exist) - These elements may or may not be present in the XML instance but implementers are required to support the migration of this information if it is present. Optional elements have a minimum cardinality of 0.

Example use of the conformance verbs to express Mandatory element:

- SHALL contain at least one [1..*]ID.

Example of use of the conformance verbs to express Optional elements:

- SHOULD contain zero or one [0..1] effectiveTime

1.5 Cardinality

When the conformance is Mandatory, the number of allowable occurrences of an element must be at least 1. The cardinality is expressed as [1..1] or [1..*], depending on whether or not the element can repeat.

If an element is Optional, the number of allowable occurrences of an element is 0; the cardinality will be expressed as [0..1] or [0..*], depending on whether or not the element can repeat.

1.6 Missing Mandatory

If the patient record does not contain data for a mandatory XML element and the data cannot be provided prior to export, the XML instance SHALL not be created.

1.7 XPath Notation

This document uses XML Path Language (XPath) notation in conformance statements and elsewhere to identify the Extended Markup Language (XML) elements and attributes within the XML instance of the patient record to which various constraints are applied. The implicit context of these expressions is the root of the document. This notation provides a mechanism that will be familiar to developers for identifying parts of an XML document.

The path is constructed from node names and attribute names (prefixed by a '@') and concatenated with a '/' symbol.

Example XML Instance

```
<Demographics>
<Names>
<cdsd:NamePrefix>Ms</cdsd:NamePrefix>
<cdsd:LegalName namePurpose="L">
...
</cdsd:LegalName>
</Names>
...
```

In the above example, the namePurpose attribute of the LegalName could be selected with the XPath expression: Names/NamePrefix/LegalName/@namePurpose.

All XML elements or attributes that are bound to code sets identified in the EMR Data Migration Data Dictionary MUST be populated with a value from the list of codes. For example, the XML element NamePrefix is bound to the code set "NAME PREFIX [CT-001]" in the EMR Data Migration Data Dictionary, and thus SHALL only contain values from that code set. The only exceptions to this conformance rule are as follows:

1. If there is conformance language that further constrains the XML element or attribute to a specific code within the code set. For example, a conformance statement such as: SHALL contain exactly one [1..1] LegalName with @namePurpose fixed to the code "L". For this instance, only the code "L" is allowed from the code set "NAME PURPOSE [CT-004]"
2. If the EMR Data Migration Data Dictionary references code systems (e.g. SNOMED CT, ICD-10, etc.) instead of code sets, then the XML element or attribute SHALL contain a code from one of the allowed code systems.
3. If the EMR Data Migration Data Dictionary states "For suggested values please see...", then the XML element or attribute SHOULD contain a code from that code set.

1.8 Working with Code Sets

The EMR Data Migration Data Dictionary provides the definitions of the data elements and references to the code sets to be used. The CodeTables tab provides the list of allowable coded values to be used. Some of the code sets are derived from external code systems and implementers should note the following:

1. Many of the code sets are derived from external code systems (i.e., lists of codes and descriptions developed and/or maintained by organizations other than OntarioMD).
2. The allowable set of coded values for a conformant XML instance are described in the EMR Migration Data Dictionary which in turn references the list of codes in the CodeTable tab. If the EMR Migration Data Dictionary references a code set for a data element, the XML instance MUST

contain a code from the referenced code set unless otherwise noted in the EMR Data Migration Implementation Guide.

- Several of the external code systems are no longer maintained. If you require a change to the list of allowable coded values, please contact OntarioMD at emr@ontariomd.com. References to the organizations responsible for the external code systems are included for historical context.

1.8.1 References to Code Systems

Problem / Diagnosis/ Procedure Description and Problem / Diagnosis/ Procedure Code data elements from the Family History Section, Problem List, and the Past Health Section state that the allowable code systems are “ENCODE-FM, SNOMED-CT, ICD9, ICD10-CA, ICPC-2”. Each of these code systems are quite large and in some cases, contain additional codes that are neither a diagnosis nor a procedure (e.g. SNOMED-CT contains codes for body sites and immunizations). Vendors are expected to pay careful attention to ensure they are using codes that correspond to a problem, diagnosis or procedure when implementing these code systems.

Each of these code systems have numerous potential codes, different maintenance cycles, and licensing arrangements. It is not possible for OntarioMD to provide a static list of coded values that pertain to problems, diagnoses and procedures from the respective standards.

Each of these codes systems also use different meta data to describe the codes, but regardless of what meta data is used there is a general pattern across the code systems:

CODE	NAME (SOMETIMES CALLED TERM, FULLY SPECIFIED NAME, DESCRIPTION OR LABEL)	CODE SYSTEM
E11	Type 2 diabetes mellitus	ICD-10-CA
73211009	Diabetes mellitus (disorder)	SNOMED-CT
7078	Diabetes Mellitus	ENCODE FM

Table 2 - Example Code System Meta Data

The fact that the different code systems have different ways of representing the ‘names’ of coded concepts can make it difficult to determine what ‘name’ to place in the following ‘description’ elements:

- ProblemDiagnosisProcedureDescription element in the Family History category
- PastHealthProblemDescriptionOrProcedures in the Past Health category
- ProblemDiagnosisDescription element in the Problem List category

The following examples illustrate how coded concept ‘names’ might be represented in the code system documentation:

- Some of the code systems have an official or fully specified name, along with a preferred name that may shorten or omit some information from the name that is not useful to clinicians, and synonym names that are semantically equivalent.
- Some of the code systems represent ‘names’ in a hierarchical (e.g., parent/child) relationship and do not show the parent ‘name’ in the child ‘name’.
- Some of the code systems use qualifiers or additional information tacked on to the ‘name’ (e.g., a body site).

Deciding which ‘name’ to export/import is further complicated by the fact that the ‘name’ displayed to the Physician in the EMR Offering (e.g., display names, preferred terms, Physician’s preferred abbreviations, etc.) and hence the information the physician considers to be captured in the patient record, can also be different from the ‘names’ associated with the code in the code system. The following guiding principles are offered to assist EMR vendors make informed decisions about how to populate the ‘description’ elements described above:

1. The ‘name’ placed in the ‘description’ element SHOULD be the same ‘name’ the physician saw in their user interface.
2. If there is only one ‘name’ stored in the EMR Offering it SHOULD be placed in the ‘description’ element.
3. If there are multiple ‘names’ (e.g., preferred terms, synonyms, etc.) stored in the EMR Offering it SHOULD place the preferred term in the ‘description’ element.

For vendors that are looking to implement SNOMED CT, Canada Health Infoway provides a terminology service that has lists of SNOMED CT codes for different concepts. For example, users can search on the concept “Health Concerns” to retrieve a static list of SNOMED CT codes that could be used to describe a Problem or Diagnosis.

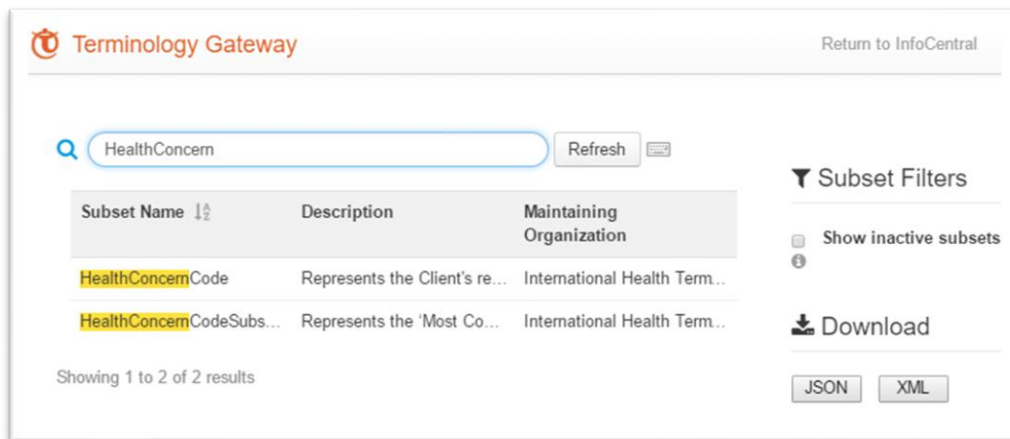


Figure 1 - Terminology Gateway Search

Terminology Gateway Return to InfoCentral

Overview **Concepts** Change Logs

Search

Concept Code	English Preferred Term	Concept Name
448212009	Anaplastic large cell lymphoma...	Anaplastic lymphoma kinase n...
255031003	Anaplastic thyroid carcinoma	Anaplastic thyroid carcinoma (d..
442433009	Anasarca	Anasarca (finding)
404023006	Ancient neurilemmoma	Ancient neurilemmoma (disorder)
294871008	Ancrod allergy	Ancrod allergy (disorder)
240854000	Ancylostomal cutaneous larva ...	Ancylostomal cutaneous larva ...
63479002	Ancylostomiasis	Ancylostomiasis (disorder)
22728002	Ancylostomiasis due to Ancylo...	Ancylostomiasis due to Ancylo...

May 31, 2012

July 31, 2013

Subset

Download

Concept

Filters

Figure 2 - HealthConcernCode List of Values

Similarly, the concept called “ActProcedureCode” contains a list of SNOMED CT codes for procedures. The list of codes can be downloaded in XML, Excel and JSON formats. The terminology service is available from the Canada Health Infoway Terminology Gateway: <https://tgateway.infoway-inforoute.ca/subsets.html> (user name and password may be required).

1.9 Data Types

The EMR Data Migration Data Dictionary uses the following data types:

DATA TYPE	DEFINITION	EXAMPLE
DATE	Expresses date information using YYYY-MM-DD, where: YYYY = four-digit year MM = two-digit month DD = two-digit day of month (01 through 31) Please see the write up below on representing full and partial dates.	1967-01-31
DATE/TIME	Expresses date and time information using YYYY-MM-DDThh:mm:ss.sTZD, where: YYYY = four-digit year MM = two-digit month DD = two-digit day of month (01 through 31) T = a separator between the date and time hh = two digits of hour (00 through 23) mm = two digits of minute (00 through 59) ss = two digits of second (00 through 59) s = one or more digits representing a decimal fraction of a second TZD = time zone designator (Z or +hh:mm or -hh:mm)	1997-07-16T19:20:30.45+01:00

DATA TYPE	DEFINITION	EXAMPLE
TIME	Expresses time information using hh:mm:ss.sTZD, where: hh = two digits of hour (00 through 23) mm = two digits of minute (00 through 59) ss = two digits of second (00 through 59) s = one or more digits representing a decimal fraction of a second TZD = time zone designator (Z or +hh:mm or -hh:mm)	19:20:30.45+01:00
NUM	Expresses information that can only be represented using the digits 0 through 9	1020
AB	Expresses information that can be represented using letters and symbols	Heart disease; Acute.
AN	Expresses information that can be represented using letters, numbers and symbols	Less than 10 mmHG

Table 3 - Data Types

Full and Partial Dates

There are several XML elements that can be expressed using full or partial dates. For example, the element OnSetOrEventDate is used to describe the date on which a patient had a past health diagnosis or procedure. The expression of partial dates is required because patients do not always recall the exact year, month and day when they received a diagnosis. Elements that are of the type dateFullOrPartial have a choice of which child element to use to represent the date. The choices are:

1. YearOnly. Expressed as the four-digit year (YYYY).
2. YearMonth. Expressed as four-digit year and two-digit month with a hyphen between them (YYYY-MM).
3. FullDate: Expressed as four-digit year, two-digit month, and two-digit day with a hyphen between them (YYYY-MM-DD).

Similar child element structures are also used for any elements of the type dateTimeFullOrPartial and include a fourth option to express the full date time.

1.10 Field Length

The EMR Data Migration Data Dictionary uses the following notation to describe limits on the number of characters that can be contained within XML tags for a data element.

“Number” - An actual number is provided (e.g. 10, 50, etc.). The limit number may also be represented by the symbol “k” which represents “1000” (e.g. 32k = 32,000).

NL - No Limit

BOT – Based On Type

1.11 UTF-8 Encoding

The XML instances SHALL only contain characters encoded using the UTF-8 encoding format. The following website contains a complete list of UTF-8 characters and is provided only as a reference: <http://www.utf8-chartable.de/> Please note that readers may have to select a different block (e.g. U+0000...U+00FF) to find characters and their encodings.

2. PATIENT RECORDS

Exporting EMR vendors SHALL create one XML instance per patient. Each XML instance MUST include the name and version of EMR Offering that created it and name and version of the XML Schema it was validated against using the XML comment syntax. This information MUST be present *after* the XML prolog and *before* the PatientRecord root element. The following is an example of how to represent the XML Schema in the XML instance:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<!--file created by EMR NAME v10.5, compliant with EMR_Data_Migration_Schema.xsd version 1.0/ Publish
Date: April 1, 2015; Status: FINAL-->
```

Each XML instance MUST have a Demographics category. Exporting EMR vendors MUST export all patient data into the corresponding XML elements and/or attributes as defined by the EMR Data Migration Schemas. If there is multiple patient data for a data category, then the XML instance MUST contain multiple instances of the data category. For example, if a patient has 5 medications in her record, then there will be 5 MedicationsAndTreatments categories in the XML instance.

2.1 PatientRecord

XML Instance Conformance Expectations:

- 1) SHALL contain exactly one [1..1] Demographics
- 2) SHOULD contain zero or more [0..*] PersonalHistory
- 3) SHOULD contain zero or more [0..*] FamilyHistory
- 4) SHOULD contain zero or more [0..*] PastHealth
- 5) SHOULD contain zero or more [0..*] ProblemList
- 6) SHOULD contain zero or more [0..*] RiskFactors
- 7) SHOULD contain zero or more [0..*] AllergiesAndAdverseReactions
- 8) SHOULD contain zero or more [0..*] MedicationsAndTreatments
- 9) SHOULD contain zero or more [0..*] Immunizations
- 10) SHOULD contain zero or more [0..*] LaboratoryResults
- 11) SHOULD contain zero or more [0..*] Appointments
- 12) SHOULD contain zero or more [0..*] ClinicalNotes
- 13) SHOULD contain zero or more [0..*] Reports
- 14) SHOULD contain zero or more [0..*] CareElements
- 15) SHOULD contain zero or more [0..*] AlertsAndSpecialNeeds
- 16) SHOULD contain zero or more [0..*] NewCategory

3. DEMOGRAPHICS

The purpose of this category is to express demographic information about the patient and the relationship between the patient and a physician. Data in this category represents a snapshot of the patient data within the medical record at the time of export.

This Demographics Category has elements that express information about Primary Physicians, Family Physicians, Referred Physicians, and Enrolled to Physicians. The differences between the use of the different data elements can be a source of confusion for implementers. The following guidance is offered to explain how to use these elements in the context of an EMR Data Migration:

CONCEPT	GUIDANCE
Primary Physician	Used to express data about the physician who is most responsible for the patient record being migrated; this is often the physician who is recorded in the EMR Offering as being primarily responsible for the patient’s care or has the patient on their roster. However, there are situations where a physician may be responsible for the patient record being migrated, but is not considered most responsible for the patient’s care.
Enrolled to Physician	Used to express data about the physician who the patient is enrolled to as per the Ontario Ministry of Health enrollment processes It is possible for the Primary Physician and Enrolled to Physician be the same person or to be two different people.
Referred Physician	Used to express data about the physician who referred the patient to the Primary Physician
Family Physician	Used to express data about the patient’s family physician (sometimes called General Practitioner); these elements are primarily required to support specialists who need to know the name of the patient’s family physician when it is different from the name of the Referred Physician, which is often the case when a patient was in a hospital and received the referral to the specialist. These elements can be omitted from the XML instance if the Primary Physician is a Family Physician or General Practitioner for the patient whose record is being migrated.

Table 4 - Physician Types

XML Instance Conformance Expectations:

- 1) SHALL contain exactly one [1..1] Names
- 2) SHALL contain exactly one [1..1] DateOfBirth
- 3) SHOULD contain zero or one [0..1] HealthCard
- 4) SHOULD contain zero or one [0..1] ChartNumber
- 5) SHALL contain exactly one [1..1] Gender
- 6) SHALL contain exactly one [1..1] UniqueVendorIdSequence
- 7) SHALL contain one or more [1..*] Address
- 8) SHALL contain one or more [1..*] PhoneNumber

- 9) SHOULD contain zero or one [0..1] PreferredOfficialLanguage
- 10) SHOULD contain zero or one [0..1] PreferredSpokenLanguage
- 11) SHOULD contain zero or many [0..*] Contact
- 12) SHOULD contain zero or one [0..1] NoteAboutPatient
- 13) SHOULD contain zero or one [0..1] Enrolment
- 14) SHOULD contain zero or one [0..1] PrimaryPhysician
- 15) SHOULD contain zero or one [0..1] Email
- 16) SHALL contain exactly one [1..1] PersonStatusCode
- 17) SHOULD contain zero or one [0..1] PersonStatusDate
- 18) SHOULD contain zero or one [0..1] SIN
- 19) SHOULD contain zero or one [0..1] ReferredPhysician
- 20) SHOULD contain zero or one [0..1] FamilyPhysician
- 21) SHOULD contain zero or one [0..1] PreferredPharmacy

3.1 Demographics/Names

Patients may have multiple names. The XML Instance SHALL contain the legal name of the patient at a minimum. If a patient has multiple names recorded from different sources (e.g., a license, a health card, etc.), it is recommended to use the data from the health card to populate the child elements under the LegalName element.

The XML instance SHOULD include other names (e.g., nicknames, maiden names, etc.) if they are available in the source EMR Offering.

A patient’s middle name(s) is considered a type of given name and is expressed using the OtherName/Part with OtherName/PartType fixed to the code “GIV”. It is important to note that the order of a patient’s middle names should be reflected in the order in which they appear in the XML instance. For example, a person with a name on their health card of “Elizabeth Jane Merle Smith” and a preference to be called “Beth” would have an XML instance as follows:

```

...
<Names>
  <cdsd:LegalName namePurpose="L">
    <cdsd:FirstName>
      <cdsd:Part>Elizabeth</cdsd:Part>
      <cdsd:PartType>GIV</cdsd:PartType>
    </cdsd:FirstName>
    <cdsd:LastName>
      <cdsd:Part>Smith</cdsd:Part>
      <cdsd:PartType>FAMC</cdsd:PartType>
    </cdsd:LastName>
    <cdsd:OtherName>
      <cdsd:Part>Jane</cdsd:Part>
      <cdsd:PartType>GIV</cdsd:PartType>
    </cdsd:OtherName>
    <cdsd:OtherName>
      <cdsd:Part>Merle</cdsd:Part>

```

```

        <cdsd:PartType>GIV</cdsd:PartType>
    </cdsd:OtherName>
</cdsd:LegalName>
<cdsd:OtherNames namePurpose="AL">
    <cdsd:OtherName>
        <cdsd:Part>Beth</cdsd:Part>
        <cdsd:PartType>Giv</cdsd:PartType>
    </cdsd:OtherName>
</cdsd:OtherNames>
</Name>
...

```

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] NamePrefix
- 2) SHALL contain exactly one [1..1] LegalName with @namePurpose populated with "L"
 - a) SHALL contain exactly one [1..1] FirstName
 - i) SHALL contain exactly one [1..1] Part
 - ii) SHALL contain exactly one [1..1] PartType fixed to the code "GIV"
 - iii) SHOULD contain zero or one [0..1] PartQualifier
 - b) SHALL contain exactly one [1..1] LastName
 - i) SHALL contain exactly one [1..1] Part
 - ii) SHALL contain exactly one [1..1] PartType fixed to the code "FAMC"
 - iii) SHOULD contain zero or one [0..1] PartQualifier
 - c) SHOULD contain zero or more [0..*] OtherName, and if present
 - i) SHALL contain exactly one [1..1] Part
 - ii) SHALL contain exactly one [1..1] PartType fixed to the code "GIV"
 - iii) SHOULD contain zero or one [0..1] PartQualifier
- 3) SHOULD contain zero or more [0..*] OtherNames with @namePurpose populated, and if present
 - a) SHALL contain one or more [1..*] OtherName, and if present
 - i) SHALL contain exactly one [1..1] Part
 - ii) SHALL contain exactly one [1..1] PartType
 - iii) SHOULD contain zero or one [0..1] PartQualifier
- 4) SHOULD contain zero or one [0..1] LastNameSuffix

3.2 Demographics/HealthCard

- 1) SHALL contain exactly one [1..1] Number
- 2) SHALL contain exactly one [1..1] Version
- 3) SHALL contain exactly one [1..1] ExpiryDate
- 4) SHALL contain exactly one [1..1] ProvinceCode

3.3 Demographics/Address

- 1) @addressType SHALL be fixed to a code from Table CT-011: Address Type

The @addressType denotes if the address is a residential address, mailing address, etc. Some EMR Offerings store address data as discrete data fields, while others do not. If the source EMR Offering stores address as discrete data fields, the address data MUST be expressed using the structured element where the intent is that data such as street number, street name, apartment or unit number are expressed using Lines 1, 2 and 3.

3.3.1 Demographics/Address/Structured

- 1) SHOULD contain zero or one [0..1] Line1
- 2) SHOULD contain zero or one [0..1] Line2
- 3) SHOULD contain zero or one [0..1] Line3
- 4) SHOULD contain zero or one [0..1] City
- 5) SHOULD contain zero or one [0..1] CountrySubDivisionCode
- 6) SHOULD contain zero or one [0..1] PostalZipCode

PostalZipCode SHALL not contain any spaces (e.g. the correct format for Canadian postal codes is A#A#A# and the correct format for Zip code is #####)

If mailing address is not saved discretely in the source EMR Offering, then address SHALL be exported using the Demographics/Address/Formatted element.

3.4 Demographics/PhoneNumber

Some EMR Offerings store phone numbers as discrete data fields, while others do not. If the source EMR Offering stores phone numbers as discrete data fields, the phone number data SHALL be expressed using the following sequence:

- 1) SHALL contain exactly one [1..1] areaCode
- 2) SHALL contain exactly one [1..1] number
- 3) SHOULD contain zero or one [0..1] extension
- 4) SHOULD contain zero or one [0..1] exchange

If the source EMR Offering DOES NOT store phone numbers as discrete data fields, the phone number data SHOULD be expressed using the following sequence:

- 1) SHALL contain exactly one [1..1] phoneNumber
- 2) SHOULD contain zero or one [0..1] extension

3.5 Demographics/Contact

If present,

- 1) SHOULD contain zero or many [0..*] ContactPurpose, if present SHALL contain exactly one [1..1] of

- a) PurposeAsEnum, or
- b) PurposeAsPlainText
- 2) SHALL contain exactly one [1..1] NAME
 - a) SHOULD contain zero or one [0..1] FirstName
 - b) SHOULD contain zero or one [0..1] MiddleName
 - c) SHOULD contain zero or one [0..1] LastName
- 3) SHALL contain at least one [1..*] PhoneNumber
 - a) If the source EMR Offering stores phone numbers as discrete data fields, the phone number data SHALL be expressed using the following sequence:
 - i) SHALL contain exactly one [1..1] areaCode
 - ii) SHALL contain exactly one [1..1] number
 - iii) SHOULD contain zero or one [0..1] extension
 - iv) SHOULD contain zero or one [0..1] exchange
 - b) If the source EMR Offering DOES NOT store phone numbers as discrete data fields, the phone number data SHOULD be expressed using the following sequence:
 - i) SHALL contain exactly one [1..1] phoneNumber
 - ii) SHOULD contain zero or one [0..1] extension
 - c) SHOULD contain zero or one [0..1] EmailAddress

If the source EMR Offering has Contact Purpose values that do not map to the values in CT-014 Contact Purpose and thus cannot use ContactPurpose/PurposeAsEnum, then the source EMR Offering SHALL export the data recorded by the physician using Contact/PurposeAsPlainText.

3.6 Demographics/Enrolment

If the patient has never been enrolled to a physician, then the XML instance SHALL not contain EnrolmentHistory. If a patient has never been enrolled, it is incorrect to include an EnrolmentHistory/EnrollmentStatus with the code "0".

If present, Demographics/Enrolment SHALL contain at least one [1..*] EnrolmentHistory, and if present

- 1) SHALL contain exactly one [1..1] EnrollmentStatus
- 2) SHOULD contain zero or one [0..1] EnrollmentDate
- 3) SHOULD contain zero or one [0..1] EnrollmentTerminationDate
- 4) SHOULD contain zero or one [0..1] TerminationReason
- 5) SHOULD contain zero or one [0..1] EnrolledToPhysician,
 - a) SHALL contain exactly one [1..1] Name, if present,
 - i) SHALL contain exactly one [1..1] FirstName
 - ii) SHALL contain exactly one [1..1] LastName
 - b) SHOULD contain zero or one [0..1] OHIPPhysicianID

EnrollmentDate SHALL be present if EnrollmentStatus has the code "1". EnrollmentTerminationDate and EnrollmentDate SHALL be present if EnrollmentStatus has the code "0". The table below highlights examples of different enrollment scenarios and the relationships between the corresponding elements.

EXAMPLE SCENARIO	XML INSTANCE GUIDANCE
The patient has never been enrolled to a physician	The Enrolment element and all child elements are omitted.
The patient is currently enrolled to physician A and has no other enrollment history	Enrolment/EnrolmentHistory has the following child elements: <ul style="list-style-type: none"> • EnrollmentStatus populated with the code “1” • EnrollmentDate populated with the date on which the patient was enrolled to physician A • EnrolledToPhysician/Name/FirstName and EnrolledToPhysician/Name/LastName are populated with the first and last name of physician A • EnrolledToPhysician/OHIPPhysicianID populated with the OHIP Physician ID for physician A
The patient is no longer enrolled to physician A	There will be one instance of Enrolment/EnrolmentHistory similar to the structure in the preceding example to express the fact that there was a past enrollment. There will be another instance of Enrolment/EnrolmentHistory with the following child elements: <ul style="list-style-type: none"> • EnrollmentStatus populated with the code “0” • EnrollmentDate populated with the date on which the patient was enrolled to physician A • EnrollmentTerminationDate populated with the date on which the patient stopped being enrolled to physician A • TerminationReason populated with a code from CT-010: Termination Reason • EnrolledToPhysician/Name/FirstName and EnrolledToPhysician/Name/LastName populated with the first and last name of physician A • EnrolledToPhysician/OHIPPhysicianID populated with the OHIP Physician ID for physician A
The patient is enrolled to physician B	There will be instances of Enrolment/EnrolmentHistory similar to each of the preceding examples. There will be a third instance of Enrolment/EnrolmentHistory with the following child elements: <ul style="list-style-type: none"> • EnrollmentStatus populated with the code “1” • EnrollmentDate populated with the date on which the patient was enrolled to physician B • EnrolledToPhysician/Name/FirstName and EnrolledToPhysician/Name/LastName populated with the first and last name of physician B • EnrolledToPhysician/OHIPPhysicianID populated with the OHIP Physician ID for physician B

Table 5 - Enrollment History Scenarios

3.7 Demographics/PrimaryPhysician

If present,

- 1) SHALL contain exactly one [1..1] Name
 - i) SHALL contain exactly one [1..1] FirstName
 - ii) SHALL contain exactly one [1..1] LastName
- 2) SHOULD contain zero or one [0..1] OHIPPhysicianID
- 3) SHOULD contain zero or one [0..1] PrimaryPhysicianCPSO

3.8 Demographics/PersonStatusCode

SHALL contain exactly one [1..1] of

- 1) PersonStatusAsEnum, or
- 2) PersonStatusAsPlainText

If the source EMR Offering has coded values for a patient's status that do not map to the values in CT-008: Patient Status, and thus cannot use PersonStatusCode/PersonStatusAsEnum, then the exported codes should be placed in PersonStatusCode/PersonStatusAsPlainText and a description of the codes SHALL be provided to the importing EMR vendor and the physician. The importing EMR vendor SHALL import PersonStatusCode/PersonStatusAsEnum or PersonStatusCode/PersonStatusAsPlainText from the XML instance.

3.9 Demographics/ReferredPhysician

If present,

- 1) SHALL contain exactly one [1..1] FirstName
- 2) SHALL contain exactly one [1..1] LastName

3.10 Demographics/FamilyPhysician

If present,

- 1) SHALL contain exactly one [1..1] FirstName
- 2) SHALL contain exactly one [1..1] LastName

3.11 Demographics/PreferredPharmacy

If present,

- 1) SHALL contain [1..1] PharmacyName
- 2) SHOULD contain [0..1] Address, if present @addressType SHALL be fixed to the code "M" from Table CT-011: Address Type, and
 - a) SHOULD contain [0..1] Formatted, or
 - b) SHOULD contain [0..1] Structured, and if present
 - i) SHOULD contain zero or one [0..1] Line1
 - ii) SHOULD contain zero or one [0..1] Line2
 - iii) SHOULD contain zero or one [0..1] Line3
 - iv) SHOULD contain zero or one [0..1] City
 - v) SHOULD contain zero or one [0..1] CountrySubDivisionCode
 - vi) SHOULD contain zero or one [0..1] PostalZipCode

PostalZipCode SHALL not contain any spaces (e.g. the correct format for Canadian postal codes is A#A#A#. Zip code format is #####)

- 2) SHOULD contain zero or many [0..*] PhoneNumber, if present @phoneNumberType SHALL be fixed to the code "W"
 - a) If the source EMR Offering stores phone numbers as discrete data fields, the phone number data SHALL be expressed using the following sequence:
 - i) SHALL contain exactly one [1..1] areaCode
 - ii) SHALL contain exactly one [1..1] number
 - iii) SHOULD contain zero or one [0..1] extension
 - iv) SHOULD contain zero or one [0..1] exchange
 - b) If the source EMR Offering DOES NOT store phone numbers as discrete data fields, the phone number data SHOULD be expressed using the following sequence:
 - i) SHALL contain exactly one [1..1] phoneNumber
 - ii) SHOULD contain zero or one [0..1] extension
- 3) SHOULD contain [0..1] FaxNumber, if present @phoneNumberType SHALL be fixed to the code "W"
 - a) If the source EMR Offering stores fax numbers as discrete data fields, the fax number data SHALL be expressed using the following sequence:
 - i) SHALL contain exactly one [1..1] areaCode
 - ii) SHALL contain exactly one [1..1] number
 - b) If the source EMR Offering DOES NOT store fax numbers as discrete data fields, the fax number data SHOULD be expressed using the following sequence:
 - i) SHALL contain exactly one [1..1] phoneNumber
- 4) SHOULD contain zero or one [0..1] EmailAddress

4. PERSONAL HISTORY

The purpose of this category is to express patient record data that does not correspond to existing XML elements defined in the EMR Data Migration Specification and should not be grouped in an existing data category.

Please see the section titled Exporting Data Elements Not Defined by This Specification for further guidance on options for creating new data categories and use of the residual data elements.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] ResidualInfo, if present
 - a) SHALL contain one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content

5. FAMILY HISTORY

The purpose of this category is to express data about the patient's family history that may be medically relevant to the provision of patient care.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] ResidualInfo, if present
 - a) SHALL contain one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content
- 2) SHOULD contain zero or one [0..1] StartDate, partial date allowed
- 3) SHOULD contain zero or one [0..1] AgeAtOnset
- 4) SHOULD contain zero or one [0..1] LifeStage
- 5) SHOULD contain zero or one [0..1] ProblemDiagnosisProcedureDescription
- 6) SHOULD contain zero or one [0..1] DiagnosisProcedureCode, if present
 - a) SHALL contain exactly one [1..1] StandardCodingSystem
 - b) SHALL contain exactly one [1..1] StandardCode
 - c) SHALL contain exactly one [1..1] StandardCodeDescription
- 7) SHOULD contain zero or one [0..1] Treatment
- 8) SHOULD contain zero or one [0..1] Relationship
- 9) SHOULD contain zero or one [0..1] Notes

If the source EMR Offering allows free text or does not have a standard coding system for diagnoses, symptoms or procedures, then ProblemDiagnosisProcedureDescription SHALL contain the free text value entered by the physician.

If the EMR Offering does have a standard coding system for diagnoses, symptoms or procedures then please see the section titled References to Code Systems for additional guidance on selecting the code 'name' to place in ProblemDiagnosisProcedureDescription.

6. PAST HEALTH

The purpose of this category is to express data about the patient's past health that may be medically relevant to the provision of patient care. Data related to the patient's current or ongoing problems, health concerns and diagnoses should be expressed in the Problem List category.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] ResidualInfo, if present
 - a) SHALL contain one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content
- 2) SHOULD contain zero or one [0..1] PastHealthProblemDescriptionOrProcedures
- 3) SHOULD contain zero or one [0..1] DiagnosisProcedureCode, if present
 - a) SHALL contain exactly one [1..1] StandardCodingSystem
 - b) SHALL contain exactly one [1..1] StandardCode
 - c) SHALL contain exactly one [1..1] StandardCodeDescription
- 4) SHOULD contain zero or one [0..1] OnsetOrEventDate, partial date allowed
- 5) SHOULD contain zero or one [0..1] LifeStage
- 6) SHOULD contain zero or one [0..1] ResolvedDate, partial date allowed
- 7) SHOULD contain zero or one [0..1] ProcedureDate, partial date allowed
- 8) SHOULD contain zero or one [0..1] Notes
- 9) SHOULD contain zero or one [0..1] ProblemStatus

OnsetOrEventDate and ResolvedDate are intended to express dates associated with diagnoses, problems, symptoms, etc., and are not intended to express dates associated with procedures. Procedure dates are intended to be expressed using ProcedureDate.

If the source EMR Offering allows free text or does not have a standard coding system for diagnoses, symptoms or procedures, then PastHealthProblemDescriptionOrProcedures SHALL contain the free text value entered by the physician.

If the EMR Offering does have a standard coding system for diagnoses, symptoms or procedures then please see the section titled References to Code Systems for additional guidance on selecting the code 'name' to place in PastHealthProblemDescriptionOrProcedures.

7. PROBLEM LIST

The purpose of this category is to express data related to the patient’s current or ongoing problems (including signs or symptoms), health concerns and diagnoses.

EMR Offerings capture information about current problems and diagnoses in different ways, and even within an EMR Offering, physicians may enter data in different ways. The following guidance is offered to help explain these differences and potential uses of different XML elements for expressing free text data, but should not be considered conformance statements.

XML	GUIDANCE
ProblemDiagnosisDescription	Used to express the name of the health concern, problem or diagnosis (e.g., Anxiety, Pregnant, Diabetes Mellitus Type II, etc.)
ProblemDescription	Used to express a synopsis of progress or additional details about the health concern, problem or diagnosis
ProblemStatus	Used to express the state of the health concern, problem or diagnosis and usually only contains a couple of words (e.g., active, in remission, etc.)
Notes	Used to express anything the physician thought important to record about the health concern, problem or diagnosis – including additional patient reported symptoms, education or counselling provided to the patient, etc.

Table 6 - Problem List Data Element Guidance

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] ResidualInfo, if present
 - a) SHALL contain one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content
- 2) SHOULD contain zero or one [0..1] ProblemDiagnosisDescription and if present SHALL be populated with either the free text value entered by the physician, or populated with the value from StandardCodeDescription if there is no free text value.
- 3) SHOULD contain zero or one [0..1] DiagnosisCode, if present
 - a) SHALL contain exactly one [1..1] StandardCodingSystem
 - b) SHALL contain exactly one [1..1] StandardCode
 - c) SHALL contain exactly one [1..1] StandardCodeDescription
- 4) SHOULD contain zero or one [0..1] ProblemDescription
- 5) SHOULD contain zero or one [0..1] ProblemStatus
- 6) SHOULD contain zero or one [0..1] OnsetDate, partial date allowed
- 7) SHOULD contain zero or one [0..1] LifeStage
- 8) SHOULD contain zero or one [0..1] ResolutionDate, partial date allowed
- 9) SHOULD contain zero or one [0..1] Notes

If the EMR Offering has a standard coding system for diagnoses or symptoms, then please see the section titled References to Code Systems for additional guidance on selecting the code ‘name’ to place in StandardCodeDescription and in ProblemDiagnosisDescription as needed.

8. RISK FACTORS

The purpose of this category is to express data related to the patient's risk factors that are medically relevant to the provision of patient care.

There are three optional elements (Start Date, Life Stage, Age of Onset) that are used to express the age (precisely or approximately) that the patient was at when exposed to the risk factor. It is not expected that all three elements would be populated for a single risk factor entry. They are provided to accommodate differences in physician record-keeping and EMR Offering design.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] ResidualInfo, if present
 - a) SHALL contain one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content
- 2) SHOULD contain zero or one [0..1] RiskFactor
- 3) SHOULD contain zero to one [0..1] ExposureDetails
- 4) SHOULD contain zero to one [0..1] AgeOfOnset
- 5) SHOULD contain zero to one [0..1] StartDate, partial date allowed
- 6) SHOULD contain zero to one [0..1] EndDate, partial date allowed
- 7) SHOULD contain zero to one [0..1] LifeStage
- 8) SHOULD contain zero to one [0..1] Notes

9. ALLERGIES AND ADVERSE REACTIONS

The purpose of this category is to express data related to the patient's allergies and adverse reactions or intolerances.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] ResidualInfo, if present
 - a) SHALL contain one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content
- 2) SHOULD contain zero or one [0..1] OffendingAgentDescription
- 3) SHOULD contain zero or one [0..1] PropertyOfOffendingAgent
- 4) SHOULD contain zero or one [0..1] DrugCode, if present
 - a) SHALL contain exactly one [1..1] CodeType and SHALL be fixed to the code "DIN"
 - b) SHALL contain exactly one [1..1] CodeValue
- 5) SHOULD contain zero or one [0..1] ReactionType
- 6) SHOULD contain zero or one [0..1] StartDate, partial date allowed
- 7) SHOULD contain zero or one [0..1] LifeStage
- 8) SHOULD contain zero or one [0..1] Severity
- 9) SHOULD contain zero or one [0..1] Reaction
- 10) SHOULD contain zero or one [0..1] RecordedDate
- 11) SHOULD contain zero or one [0..1] Notes

10. MEDICATIONS AND TREATMENTS

The purpose of this category is to express data related to past and current prescriptions and medications. This category has the XML elements to describe medications that may not have corresponding prescription details, such as when a patient tells a physician about a medication they took in the past or are currently taking, but does not know the exact prescription date or dosage. This category supports the expression of medication and prescription information as free text, as well as discrete and codified data.

Anyone involved in the exporting or importing of prescription and medication data should take extra precautions when making decisions about how to transform the data from/into their EMR Offering due to the potential to introduce patient safety risks. For example, if a medication entry does not have data for the prescription start date or the past medications indicator, it is incorrect to assume the medication is not current and import it into the EMR Offering in a way that represents the medication data as being a past medication. Extra vigilance may be required to mitigate a patient safety issue when prescribed medications are migrated to another EMR Offering that implements a different drug database.

The medication category has three data elements that are indicators, and require special attention when deciding how to use them when exporting and importing data. The XML data elements are:

XML DATA ELEMENT NAME	PURPOSE	IMPLEMENTATION GUIDANCE
LongTermMedication	Indicates if the medication is considered long-term at the time of prescription	Implementers have a choice to express the indicator using one of the following data elements: <ol style="list-style-type: none"> 1. ynIndicatorsimple. A value of “Y” indicates the medication is long-term, and a value of “N” indicates the medication is NOT long-term. 2. boolean. A value of “1” indicates the medication is long-term, and a value of “0” indicates the medication is NOT long-term.
PastMedication	Indicates that a medication has been discontinued from a patient’s treatment plan	Implementers have a choice to express the indicator using one of the following data elements: <ol style="list-style-type: none"> 1. ynIndicatorsimple. A value of “Y” indicates the medication has been discontinued from the treatment plan and a value of “N” indicates the medication is has NOT been discontinued from the treatment plan. 2. boolean. A value of “1” indicates the medication has been discontinued from the treatment plan and a value

XML DATA ELEMENT NAME	PURPOSE	IMPLEMENTATION GUIDANCE
		of “0” indicates the medication is has NOT been discontinued from the treatment plan
PatientCompliance	Indicates if the patient is taking the medication as prescribed	Implementers have a choice to express the indicator using one of the following data elements: <ol style="list-style-type: none"> 1. ynIndicatorsimple. A value of “Y” indicates the patient is taking the medication as prescribed, and a value of “N” indicates the patient is NOT taking the medication as prescribed. If there is no data to indicate if the patient is taking the medication as prescribed, then the element will be present empty but empty. 2. boolean. A value of “1” indicates the patient is taking the medication as prescribed, and a value of “0” indicates the patient is NOT taking the medication as prescribed. If there is no data to indicate if the patient is taking the medication as prescribed, then the element will be present but empty.

Table 7 - Medication and Treatment Data Element Guidance

If the source EMR Offering contains prescription or medication data in discrete or codified fields, it SHALL be expressed in the corresponding discrete fields in the XML instance.

If the same medication has been prescribed multiple times, then there SHALL be multiple instances for each prescription.

If there have been changes to a prescription such as status changes (e.g., Suspended) or changes to dosage, each change SHALL be expressed in the XML instance.

10.1 Prescriptions for Generic vs. Brand Name Medications

Physicians can prescribe medications by their brand name or their generic name. At present, Canada does not have drug identification numbers (DINs) for generic drugs. The lack of DINs for generic medications can create challenges during the importing of prescription data. Some EMRs are designed to associate a generic medication with a *representative* DIN. A representative DIN represents the important medicinal ingredients of the generic medication. However, drug databases associate other information with DINs, such as the trade medication’s name, form, and strength. As such, a prescription for a generic medication associated with a

representative DIN may have misalignment with the other information (e.g., medication name, strength, etc.) found in drug databases.

Guidance for Importing EMR Vendors

If the importing EMR vendor receives an XML instance with a DIN, but the data in the corresponding prescription elements (e.g., medication name, strength, dosage, form, etc.) do not match the corresponding data in the EMR Offering's drug database for that DIN, then there is a good chance the prescription is for a generic medication and the Exporting EMR Offering provided a representative DIN. If the Importing EMR Offering supports the use of representative DINs, then it is recommended to import it. Importing EMR Offerings should never automatically overwrite the data in the corresponding prescription elements (e.g., medication name, strength, dosage, form, etc.) with data corresponding to the DIN from the Importing EMRs drug database as this may introduce patient safety issues.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] ResidualInfo, if present
 - a) SHALL contain one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content
- 2) SHOULD contain zero or one [0..1] PrescriptionWrittenDate, partial date allowed
- 3) SHOULD contain zero or one [0..1] StartDate, partial date allowed
- 4) SHOULD contain zero or one [0..1] DrugIdentificationNumber
- 5) SHOULD contain zero or one [0..1] DrugName
- 6) SHOULD contain zero or one [0..1] Strength, if present
 - a) SHALL contain exactly one [1..1] Amount
 - b) SHALL contain exactly one [1..1] UnitOfMeasure
- 7) SHOULD contain zero or one [0..1] NumberOfRefills
- 8) SHOULD contain zero or one [0..1] Dosage
- 9) SHOULD contain zero or one [0..1] DosageUnitOfMeasure
- 10) SHOULD contain zero or one [0..1] Form
- 11) SHOULD contain zero or one [0..1] Route
- 12) SHOULD contain zero or one [0..1] Frequency
- 13) SHOULD contain zero or one [0..1] Duration
- 14) SHOULD contain zero or one [0..1] RefillDuration
- 15) SHOULD contain zero or one [0..1] Quantity
- 16) SHOULD contain zero or one [0..1] RefilQuantity
- 17) SHOULD contain zero or one [0..1] LongTermMedication, if present SHALL contain exactly one [1..1] of
 - a) ynIndicatorsimple or
 - b) boolean
- 18) SHOULD contain zero or one [0..1] PastMedication, if present SHALL contain exactly one [1..1] of
 - a) ynIndicatorsimple, or
 - b) boolean
- 19) SHOULD contain zero or one [0..1] PrescribedBy, if present
 - a) SHALL contain exactly one [1..1] Name, if present,
 - i) SHALL contain exactly one [1..1] FirstName

- ii) SHALL contain exactly one [1..1] LastName
- b) SHOULD contain zero or one [0..1] OHIPPhysicianID
- 20) SHOULD contain zero or one [0..1] Notes
- 21) SHOULD contain zero or one [0..1] PrescriptionInstructions
- 22) SHOULD contain zero or one [0..1] PatientCompliance, and if present SHALL contain exactly one [1..1] of
 - a) ynIndicatorsimple or
 - b) boolean
- 23) SHOULD contain zero or one [0..1] TreatmentType
- 24) SHOULD contain zero or one [0..1] PrescriptionStatus
- 25) SHOULD contain zero or one [0..1] NonAuthoritativeIndicator
- 26) SHOULD contain zero or one [0..1] PriorPrescriptionReferenceIdentifier
- 27) SHOULD contain zero or one [0..1] DispenseInterval
- 28) SHOULD contain zero or one [0..1] DrugDescription
- 29) SHOULD contain zero or one [0..1] SubstitutionNotAllowed
- 30) SHOULD contain zero or one [0..1] ProblemCode
- 31) SHOULD contain zero or one [0..1] ProtocolIdentifier

10.2 DrugName

DrugName SHALL be expressed as the brand or generic name under which the medication is marketed in Canada or the name entered by the physician.

10.3 Duration

Duration SHALL be expressed as a number, which describes the number of days of medication to be dispensed for the first administration of the prescription (initial dispense). If the source EMR Offering expresses this number using any other unit of time (e.g., weeks, months, etc.) then it must convert the data to the corresponding number of days.

10.4 RefillDuration

RefillDuration SHALL be expressed as a number, which describes the number of days of medication to be dispensed for a single refill of the prescription. If the source EMR Offering expresses this number using any other unit of time (e.g., weeks, months, etc.) then it MUST convert the data to the corresponding number of days.

10.5 Strength/Amount

If the source EMR Offering used a drug database to populate the DIN in the DrugIdentificationNumber element, then Amount SHALL be expressed with the amount from the first ingredient in the drug database. Otherwise, the Amount SHALL be expressed by the data entered by the physician.

10.6 SubstitutionNotAllowed

When populated with “Y”, it means the medication must be dispensed as prescribed (i.e., substitution is not allowed). When populated with “N” it means substitution is allowed.

10.7 TreatmentType

The allowable values for this element listed in CT-034 Treatment Types are derived from Canada Health Infoway's ActMedicationTherapyDurationWorkingListCode concept in the MR2009 release, available here: <https://infocentral.infoway-inforoute.ca/extra/ca/mr0206-html/html/vocabulary.html?type=vs&id=ActMedicationTherapyDurationWorkingListCode>. It should be noted that the ActMedicationTherapyDurationWorkingListCode concept has a value "PRN", which in the EMR Data Migration Specification has been split into two values "PRN – Short Term" and "PRN – Long Term".

10.8 ProblemCode

Previous versions of the EMR Data Migration Specification did not provide clear instructions on how to access the applicable code set from Canada Health Infoway for this element. If you are a new implementer, Canada Health Infoway recommends the use of the HealthConcernCode subset, which is available from the Terminology Service using the URL below and can be downloaded in JSON or XML formats: <https://tgateway.infoway-inforoute.ca/html/singlesubset.html?id=2.16.840.1.113883.2.20.3.278&versionid=20130731>

Previous implementers who worked with the MR2009 standards may have implemented this using the subsets observationProblem or otherIndication. Regardless of approach taken, the subsets are derived from the SNOMED CT code system.

11. IMMUNIZATIONS

The purpose of this category is to express data related to vaccinations a patient received to immunize them from specific bacterial and viral pathogens. If the same immunization, vaccine and/or booster is administered multiple times then there SHALL be additional instances of the Immunization category for each occurrence.

The immunizations category has one data element that is an indicator, and requires special attention when deciding how to use it when exporting and importing data. The XML data element is:

XML DATA ELEMENT NAME	PURPOSE	IMPLEMENTATION GUIDANCE
RefusedFlag	Indicates if the patient refused to receive the vaccination	Implementers have a choice to express the indicator using one of the following data elements: <ol style="list-style-type: none"> 1. ynIndicatorsimple. A value of “Y” indicates the vaccination is refused, and a value of “N” indicates the vaccination is NOT refused (i.e., is administered). 2. boolean. A value of “1” indicates the vaccination is refused, and a value of “0” indicates the vaccination is NOT refused (i.e., is administered).

Table 8 - Immunization Data Element Guidance

Vaccinations may be administered as a series of vaccinations that follow a set schedule. Information pertaining to a vaccination’s relationship to the series SHOULD be expressed in the Immunization/Instructions element.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] ResidualInfo, if present
 - a) SHALL contain one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content
- 2) SHALL contain exactly one [1..1] ImmunizationName
- 3) SHOULD contain zero or one [0..1] ImmunizationType
- 4) SHOULD contain zero or one [0..1] Manufacturer
- 5) SHOULD contain zero or one [0..1] LotNumber
- 6) SHOULD contain zero or one [0..1] Route
- 7) SHOULD contain zero or one [0..1] Site
- 8) SHOULD contain zero or one [0..1] Dose
- 9) SHOULD contain zero or one [0..1] ImmunizationCode, if present SHALL be fixed to the code “DIN” and
 - a) SHALL contain exactly one [1..1] CodingSystem
 - b) SHALL contain exactly one [1..1] value
- 10) SHOULD contain zero or one [0..1] Date, partial date allowed

- 11) SHALL contain exactly one [1..1] RefusedFlag, if present SHALL contain exactly one [1..1] of
 - a) ynIndicatorsimple or
 - b) boolean
- 12) SHOULD contain zero or one [0..1] Instructions
- 13) SHOULD contain zero or one [0..1] Notes

11.1 ImmunizationName

If the source EMR Offering has a Drug Identification Number (DIN) for the ImmunizationCode/value, then ImmunizationName SHALL be expressed with the brand name for the vaccine that corresponds to the DIN. If the source EMR Offering does not have a DIN for the ImmunizationCode/value, then ImmunizationName SHALL be expressed with the data entered by the physician.

11.2 ImmunizationType

The ImmunizationType SHALL be populated with a value from CT-020 Immunization Type. Implementers should note that while most of the codes in the code set correspond to the code from the Immunogen column from previous Canadian Immunization Guides, there are a few instances where the code from the Abbreviation column in previous Canadian Immunization Guides were introduced into the code set. There may be a few rare situations in which the exported code from CT-020 Immunization Type for a particular DIN does not match the Immunogen code for that DIN in the EMR Offering’s drug database.

11.3 ImmunizationCode

ImmunizationCode uses the code data type, which is comprised of three elements:

CodingSystem – If ImmunizationCode is present this is a mandatory child element and MUST be populated with “DIN” as described above.

value – If ImmunizationCode is present this is a mandatory child and MUST be populated with a DIN value.

Description – If ImmunizationCode is present this is an optional element and SHOULD NOT be populated. If an importing vendor receives an XML file with this element populated they can work with their client to determine if it should be imported.

12. LABORATORY RESULTS

The purpose of this category is to express data related to the patient’s laboratory test results.

The laboratory test results category has one data element that is an indicator, and requires special attention when deciding how to use it when exporting and importing data. The XML data element is:

XML DATA ELEMENT NAME	PURPOSE	IMPLEMENTATION GUIDANCE
BlockedTestResult	Indicates whether the test result is considered sensitive information	<p>If present, this element must have a value of “Y”, indicating the laboratory test result is considered sensitive information.</p> <p>If the test result is not considered sensitive information, the element SHOULD be omitted.</p>

Table 9 - Laboratory Result Data Element Guidance

Laboratory test results that only exist as an electronic document (e.g., a PDF file) should be migrated using the Reports XML elements. The Laboratory Results category described below is used for the migration of laboratory test results discrete data.

XML Instance Conformance Expectations:

- 1) SHALL contain exactly one [1..1] LaboratoryName
- 2) SHOULD contain zero or one [0..1] TestReportedByLab
- 3) SHOULD contain zero or one [0..1] LabTestCode
- 4) SHOULD contain zero or one [0..1] TestName
- 5) SHOULD contain zero or one [0..1] AccessionNumber
- 6) SHOULD contain zero or one [0..1] Result, and if present
 - a) SHALL contain exactly one [1..1] Value
 - b) SHOULD contain zero or one [0..1] UnitOfMeasure
- 7) SHOULD contain zero or one [0..1] ReferenceRange, if present
 - a) SHOULD contain zero or one [0..1] LowLimit and zero or one [0..1] HighLimit
- 8) or
 - a) SHOULD contain zero or one [0..1] ReferenceRangeText
- 9) SHOULD contain zero or one [0..1] LabRequisitionDateTime
- 10) SHALL contain exactly one [1..1] CollectionDateTime
- 11) SHOULD contain zero or many [0..*] ResultReviewer
 - a) SHALL contain exactly one [1..1] Name
 - i) SHALL contain exactly one [1..1] FirstName
 - ii) SHALL contain exactly one [1..1] LastName
 - b) SHOULD contain zero or one [0..1] OHIPPhysicianId
 - c) SHALL contain exactly one [1..1] DateTimeResultReviewed
- 12) SHALL contain exactly one [1..1] ResultNormalAbnormalFlag, populated with a value from CT-029 Laboratory Abnormal Flags or free text. If no value is provided the exporting system SHALL populate this element with the code “U” from CT-029 Laboratory Abnormal Flags.
- 13) SHOULD contain zero or one [0..1] TestResultsInformationReportedByTheLab

- 14) SHOULD contain zero or one [0..1] NotesFromLab
- 15) SHOULD contain zero or one [0..1] PhysiciansNotes
- 16) SHOULD contain zero or one [0..1] TestResultStatus
- 17) SHOULD contain zero or one [0..1] BlockedTestResult, if present SHALL be fixed to the code "Y"

13. APPOINTMENTS

The purpose of this category is to express data related to the patient's past and future appointments.

Exporting Appointments:

The exporting EMR vendor SHALL export all past and future appointments belonging to a patient, regardless of whether or not the practitioner is part of the new EMR Implementation.

Importing Appointments:

The importing EMR vendor SHALL import all appointments related to the patient regardless of whether or not the practitioner is a part of the new EMR implementation.

XML Instance Conformance Expectations:

- 1) SHALL contain exactly one [1..1] AppointmentTime
- 2) SHOULD contain zero or one [0..1] Duration
- 3) SHOULD contain zero or one [0..1] AppointmentStatus
- 4) SHALL contain exactly one [1..1] AppointmentDate
- 5) SHOULD contain zero or one [0..1] Provider, if present
 - a) SHALL contain exactly one [1..1] Name, if present,
 - i) SHALL contain exactly one [1..1] FirstName
 - ii) SHALL contain exactly one [1..1] LastName
 - b) SHOULD contain zero or one [0..1] OHIPPhysicianId
- 6) SHOULD contain zero or one [0..1] AppointmentPurpose
- 7) SHOULD contain zero or one [0..1] AppointmentNotes

14. CLINICAL NOTES

The purpose of this category is to express data related to physicians' notes about the patient, such as a Progress Note. The notes expressed in this category are primarily for the use of the physician who authored the note. For clarity, referral notes and other types of notes that are authored by the Primary Physician and sent to another person should be expressed in the Reports category.

This category may express one or more types of clinical notes that the physician and staff record and the physician signs-off.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] NoteType
- 2) SHOULD contain zero or one [0..1] MyClinicalNotesContent
- 3) SHOULD contain zero or one [0..1] EventDateTime
- 4) SHOULD contain zero or many [0..*] ParticipatingProviders, if present
 - a) SHALL contain exactly one [1..1] Name, if present,
 - i) SHOULD contain zero or one [0..1] FirstName
 - ii) SHOULD contain zero or one [0..1] LastName
 - b) SHOULD contain zero or one [0..1] OHIPPhysicianId
 - c) SHALL contain exactly one [1..1] DateTimeNoteCreated
- 5) SHOULD contain zero or many [0..*] NoteReviewer, if present
 - a) SHALL contain exactly one [1..1] Name, if present,
 - i) SHALL contain exactly one [1..1] FirstName
 - ii) SHALL contain exactly one [1..1] LastName
 - b) SHOULD contain zero or one [0..1] OHIPPhysicianId
 - c) SHALL contain exactly one [1..1] DateTimeNoteReviewed

14.1 MyClinicalNotesContent

If the source EMR Offering stores notes in different components (e.g., storing the text for the subjective, objective, assessment and plan of a SOAP note in different fields), then the different components SHALL be concatenated into a single body of text and expressed in the MyClinicalNotesContent element. If additional annotation / updates to a clinical note were performed by different authorized providers, then the MyClinicalNotesContent element SHALL express all the annotated/updated text as well. For clarity, if there is a clinical note that was created by one physician and subsequently edited by one or more other physicians, the original note and the edits should be included in a single instance of the MyClinicalNotesContent element.

15. REPORTS

The purpose of this category is to express data about reports that the most responsible provider either received or sent that pertain to the patient. This category may express one or more Reports as text, audio and image files.

There may be situations where a patient record has a report referenced in the Reports category and the data from the report is also expressed as discrete data in another category of the record. For example, a patient record may have a lab report referenced in the Reports category available as a standalone document, and the same data from the report is also expressed in the Laboratory Test Results category.

If the patient record in the source EMR Offering has a report and data from the report is also stored as discrete data, both the report and the discrete data MUST be expressed in the exported XML instance. The physician and the importing EMR vendor can decide if both the discrete data and the report need to be imported into the target EMR Offering.

Previous versions of the EMR Data Migration Specification focused only on 'Reports Received'. Several changes were introduced to support the migration of reports that were received by, and reports that were sent by, the most responsible physician for the patient. Highlights of the changes include:

- Revising data element definitions that apply to both reports received and sent to use neutral language. For example, SourceAuthorPhysician was previously defined as the “the external provider who authored the report.” The word ‘external’ was removed.
- Added elements to express who was the recipient of the report, and when the report was sent.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or one [0..1] Media
- 2) SHOULD contain zero or one [0..1] Format and if present, SHALL be fixed to the code “Text” if the report content is text based OR fixed to the code “Binary” if the report content is encoded in base64 binary file
- 3) SHOULD contain zero or one [0..1] FileExtensionAndVersion and SHALL be populated if Format is populated with “Binary”
- 4) SHOULD contain zero or one [0..1] FilePath
- 5) SHOULD contain zero or one [0..1] Content, and if present, SHALL contain exactly one [1..1] of
 - a) TextContent, or
 - b) Media
- 6) SHALL contain exactly one [1..1] Class
- 7) SHOULD contain zero or one [0..1] SubClass
- 8) SHOULD contain zero or one [0..1] EventDateTime
- 9) SHOULD contain zero or one [0..1] ReceivedDateTime
- 10) SHOULD contain zero or one [0..1] SourceAuthorPhysician, if present
 - a) SHOULD contain zero or one [0..1] AuthorName, if present,
 - i) SHOULD contain zero or one [0..1] FirstName
 - ii) SHOULD contain zero or one [0..1] LastName
- 11) or
 - a) SHOULD contain zero or one [0..1] AuthorFreeText
- 12) SHOULD contain zero or one [0..1] SourceFacility
- 13) SHOULD contain zero or many [0..*] ReportReviewed, if present

- a) SHALL contain exactly one [1..1] Name, if present,
 - i) SHALL contain exactly one [1..1] FirstName
 - ii) SHALL contain exactly one [1..1] LastName
- b) SHOULD contain zero or one [0..1] ReviewingOHIPPhysicianId
- c) SHALL contain exactly one [1..1] DateTimeReportReviewed
- 14) SHOULD contain zero or one [0..1] SendingFacilityId
- 15) SHOULD contain zero or one [0..1] SendingFacilityReport
- 16) SHOULD contain zero or many [0..*] OBRContent, if present
 - a) SHOULD contain zero or one [0..1] AccompanyingSubClass
 - b) SHOULD contain zero or one [0..1] AccompanyingMnemonic
 - c) SHOULD contain zero or one [0..1] AccompanyingDescription
 - d) SHOULD contain zero or one [0..1] ObservationDateTime
- 17) SHOULD contain zero or one [0..1] HRMResultStatus
- 18) SHOULD contain zero or one [0..1] MessageUniqueID
- 19) SHOULD contain zero or one [0..1] Notes
- 20) SHOULD contain zero or one [0..1] RecipientName, if present,
 - a) SHOULD contain zero or one [0..1] FirstName
 - b) SHOULD contain zero or one [0..1] LastName
- 21) SHOULD contain zero or one [0..1] DateTimeSent

15.1 FilePath

For patients with large numbers of reports and images, placing the corresponding binary data in the Content element can lead to XML instances with file sizes that are too big to store on some types of media, validate, or transfer over networks. In these situations, an acceptable work around is to provide the individual reports as separate files and to provide the relative file path to individual the reports, which MUST be placed in the FilePath element, and to inform the importing EMR vendor that this work around was used for specific patients. The expectation is that separate files will be placed in the same folder as the XML instance that references them. As such, exporting EMR vendors MUST use a relative path expression by providing the sub folder name(s) and name of the separate file.

If the report is provided as a standalone document, then Format SHALL be populated with the code “Binary”.

15.2 Class and SubClass

Class is a mandatory element with allowable values drawn from the Report Class Table [CT-027].

Implementers that need to express reports or letters sent by the most responsible physician should consider the codes that correspond to Consultant Report, Medical Record Report, and Other Letter. The SubClass element is optional and, can be used to express in free text subtyping of the report sent that is meaningful to the source author. For example, SubClass could be used to represent a Lab Report subtype such as “Biochemistry” or an Other Letter subtype such as Employee Absentee Letter. For reports received, SubClass will most often be populated by the Sending (Source) Facility’s system.

15.3 Elements Required for Reports Received from Health Report Manager

If the source EMR Offering is expressing a report that was received from the Health Report Manager (HRM) system then the following data elements SHALL be populated with the corresponding values from HRM, and if

the source EMR Offering is not expressing a report received from the HRM system, then these elements may be omitted:

1. SourceFacility
2. SendingFacilityID
3. SendingFacilityReport
4. OBRContent/AccompanyingSubClass
5. OBRContent/ AccompanyingMnemonic
6. OBRContent/AccompanyingDescription
7. OBRContent/ObservationDateTime
8. HRMResultStatus
9. MessageUniqueID

15.4 Distinguishing Reports Received Versus Reports Sent

Reports received by the person named in the PrimaryPhysician element will generally have a different person's name as the SourceAuthorPhysician, and will have data for ReceivedDateTime, and ReportReviewed.

Reports sent by the person named in the PrimaryPhysician element will generally have that person's name as the SourceAuthorPhysician.

The ReportRecipient and the DateTimeSent elements are provided primarily as meta data about reports sent (i.e., where the most responsible physician is the SourceAuthor of the report and sent it to a recipient). For reports received, it is generally assumed that the most responsible physician is the recipient and DateTimeReceived will be populated and DateTimeSent will not be present.

16. CARE ELEMENTS

The purpose of this category is to express data mostly related to general observations about the patient such as height, weight and smoking status, and vital signs such as blood pressure. This data is often needed for providing care to patients with chronic diseases. The Care Elements category may contain multiple occurrences of patient health-related characteristic documented within the EMR and every occurrence in the EMR MUST be expressed in the XML instance. For example, if the exporting EMR contains multiple blood pressure readings within the Care Elements category for a patient then each occurrence of the blood pressure readings will be expressed in the XML instance.

Care elements refer to clinical data captured as a part of the clinical encounter as described in other EMR specifications such as the EMR Chronic Disease Management Specification and the Primary Care Baseline Requirements Specification.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero or many [0..*] SmokingStatus, if present,
 - a) SHALL contain exactly one [1..1] Status
 - b) SHALL contain exactly one [1..1] Date
- 2) SHOULD contain zero or many [0..*] SmokingPacks, if present
 - a) SHALL contain exactly one [1..1] PerDay
 - b) SHALL contain exactly one [1..1] Date
- 3) SHOULD contain zero or many [0..*] Weight, if present
 - a) SHALL contain exactly one [1..1] Weight
 - b) SHALL contain exactly one [1..1] WeightUnit and SHALL be fixed to the code “kg”
 - c) SHALL contain exactly one [1..1] Date
- 4) SHOULD contain zero or many [0..1] Height, if present
 - a) SHALL contain exactly one [1..1] Height
 - b) SHALL contain exactly one [1..1] HeightUnit and SHALL be fixed to the code “cm”
 - c) SHALL contain exactly one [1..1] Date
- 5) SHOULD contain zero or many [0..*] WaistCircumference, if present
 - a) SHALL contain exactly one [1..1] WaistCircumference
 - b) SHALL contain exactly one [1..1] WaistCircumferenceUnit and SHALL be fixed to the code “cm”
 - c) SHALL contain exactly one [1..1] Date
- 6) SHOULD contain zero or many [0..*] BloodPressure, if present
 - a) SHALL contain exactly one [1..1] SystolicBP
 - b) SHALL contain exactly one [1..1] DiastolicBP
 - c) SHALL contain exactly one [1..1] BPUnt and SHALL be fixed to the code “mmHg”
 - d) SHALL contain exactly one [1..1] Date
- 7) SHOULD contain zero or many [0..*] DiabetesComplicationsScreening, if present
 - a) SHALL contain exactly one [1..1] ExamCode
 - b) SHALL contain exactly one [1..1] Date
- 8) SHOULD contain zero or many [0..*] DiabetesMotivationalCounselling, if present
 - a) SHALL contain exactly one [1..1] CounsellingPerformed
 - b) SHALL contain exactly one [1..1] Date
- 9) SHOULD contain zero or many [0..*] DiabetesSelfManagementCollaborative, if present
 - a) SHALL contain exactly one [1..1] CodeValue and SHALL be fixed to the code “44943-9”

- b) SHALL contain exactly one [1..1] DocumentedGoals
- c) SHALL contain exactly one [1..1] Date
- 10) SHOULD contain zero or many [0..*] DiabetesSelfManagementChallenges, if present
 - a) SHALL contain exactly one [1..1] CodeValue and SHALL be fixed to the code "44941-3"
 - b) SHALL contain exactly one [1..1] ChallengesIdentified
 - c) SHALL contain exactly one [1..1] Date
- 11) SHOULD contain zero or many [0..*] DiabetesEducationalSelfManagement, if present
 - a) SHALL contain exactly one [1..1] EducationalTrainingPerformed
 - b) SHALL contain exactly one [1..1] Date
- 12) SHOULD contain zero or many [0..*] HypoglycemicEpisodes, if present
 - a) SHALL contain exactly one [1..1] NumOfReportedEpisodes
 - b) SHALL contain exactly one [1..1] Date
- 13) SHOULD contain zero or many [0..*] SelfMonitoringBloodGlucose, if present
 - a) SHALL contain exactly one [1..1] SelfMonitoring
 - b) SHALL contain exactly one [1..1] Date

17. ALERTS AND SPECIAL NEEDS

The purpose of this category is to express data about the patient that is important for physicians to consider in the provision of patient care. For example, this category might be used to express data about a patient's difficulty following instructions or counselling or a concern that the patient is at risk of having a mental or physical health concern. For clarity, this category is intended to express data that would not logically be grouped under other categories in the EMR Data Migration XML Schema.

EMR Offerings use different approaches to facilitate a physician's ability record information that they would deem an alert or special need. Even within an EMR Offering, two different physicians may record data about alerts and special needs in different ways.

XML Instance Conformance Expectations:

- 1) SHOULD contain zero to one [0..1] ResidualInfo, if present
 - a) SHALL contain exactly one to many [1..*] DataElement, if present
 - i) SHALL contain exactly one [1..1] Name
 - ii) SHALL contain exactly one [1..1] DataType
 - iii) SHALL contain exactly one [1..1] Content
- 2) SHOULD contain zero to one [0..1] AlertDescription
- 3) SHOULD contain zero to one [0..1] Notes
- 4) SHOULD contain zero to one [0..1] DateActive, partial date allowed
- 5) SHOULD contain zero to one [0..1] EndDate, partial date allowed

18. SUPPORTING INFORMATION

18.1 Exporting Data Elements Not Defined by This Specification

If there is a need to migrate EMR data not defined by the EMR Data Migration Schemas, and it is not possible to get access to an extract of the source EMR Offering’s database and corresponding look up tables, it is possible to migrate the data using the approaches defined here.

There are two common scenarios for migrating patient data that is not defined by the EMR Data Migration Schemas, but would be helpful to have included in the XML instance of the patient record.

1. Existing Data Category: The data that needs to be migrated conceptually belongs to an existing category (e.g., Immunizations) defined by the EMR Data Migration Schemas and will use the approach that involves the use of ResidualInfo XML data elements within the existing category.
2. Personal History Data Category: The data that needs to be migrated doesn’t belong to an existing data category defined by the EMR Data Migration Schemas and will use the approach that involves the use of ResidualInfo XML data elements within the Personal History Data Category.
3. New Data Category: The data that needs to be migrated conceptually belong to a category that has not been defined by the EMR Data Migration Schemas and will need to create a new category and corresponding data elements.

Please see the section titled Other Data for a discussion on migrating data that does not conceptually belong to a patient record, such as administrative and system data as defined in EMR Data Migration Business View.

18.1.1 Existing Data Category

Within each respective data category of the EMR Data Migration Specification, residual data will be captured within three fields.

This structure will allow exporting EMR vendors a flexible method to represent existing data that does not fit into any other defined field and allow importing EMR vendors to quickly identify what the residual data represents and its corresponding data type.

Exporting EMR vendors MUST NOT place data in residual data elements that are logically equivalent to elements defined in the EMR Data Migration Schemas and Data Dictionary.

All three fields MUST be grouped in a set and can be repeated multiple times, as a group, within each category as required.

FIELD NAME	FIELD DESCRIPTION	XML	NOTES
Name	The name of the data field	<name> ... </name>	
Type	The primitive XML datatype of the data field	<datatype> ... </datatype>	Mandatory if a Residual Data Element Name is provided Note: if DataType = Date then date format must follow W3C Date Standard

FIELD NAME	FIELD DESCRIPTION	XML	NOTES
Content	The content of the data element	<content> ... </content>	Mandatory if a Residual Data Element Name is provided

Table 10 - Residual Data

To illustrate an example of how the residual data fields are to be used, assume that a patient has the following Personal History information that needs to be expressed:

Patient is employed as a commercial airline pilot since September 1997.

Using the residual data fields, this data can be represented:

```

<ResidualInfo>
<cdsd:DataElement>
<cdsd:Name>Occupation</cdsd:Name >
<cdsd:DataType>text</cdsd:DataType>
<cdsd:Content>Airline Pilot</cdsd:Content>
</cdsd:DataElement>
<cdsd:DataElement>
<cdsd:Name>Employment Start Date</cdsd:Name>
<cdsd:DataType>date</cdsd:DataType>
<cdsd:Content>1997-09-01</cdsd:Content>
</cdsd:DataElement>
</ResidualInfo>

```

18.1.2 New Data Category

If there is a need to migrate patient data that cannot be logically grouped under the Personal History category or any other existing category, then the following approach can be used to create a new category to describe data elements that should be logically grouped together under PatientRecord/NewCategoryName. Exporting EMR vendors MUST NOT place data in the New Data Category XML elements that logically fits within an existing data category.

FIELD NAME	FIELD DESCRIPTION	XML	NOTES
Category Name	The name of the new category	<CategoryName> ... </CategoryName>	
Category Description	Description of the purpose of the new category	<CategoryDescription> ... </CategoryDescription>	The content within the NewCategoryNameDescription tags SHALL be written using words generally understood by physicians and EMR vendors to help them understand what types of data will be expressed in this new category. This includes providing information about the data format (e.g. text, base 64, etc.).

Table 11 - New Data Category Data Element Guidance

The following is an example XML instance highlighting the creation of a new data category to express data related to a patient’s mobile application:

```

...
<NewCategory>
<CategoryName>Patient Mobile App Data</CategoryName>
<CategoryDescription>Contains data recorded from the patient’s use of a mobile application to track their physical activity</CategoryDescription>
<ResidualInfo>
...
</ResidualInfo>
</NewCategory>

```

Once a new data category is created, the new data elements to be expressed within the new category SHALL follow the ResidualInfo pattern described in the section titled Existing Data Category.

18.1.3 Additional Considerations

Data about a patient’s health can often be modeled and expressed using HL7’s approach to describe Observations. For example, a lab result, a blood pressure reading, and past health problem are considered types of observations.

While there are differences between how observations are modeled and physically expressed between HL7 v2, v3 and FHIR (Fast Healthcare Interoperability Resources), there are common patterns that implementers should consider re-using when trying to express data not defined by EMR Data Migration Schema. Please see

the observation resource for an example of how an observation is modeled in FHIR:
<https://www.hl7.org/fhir/observation.html>

Observations are often expressed as name-value-pairs, where the observation name is expressed as a code (e.g., a code that describes the type of observation) and the value is expressed as a number (e.g., the numeric a systolic blood pressure value) or another code (e.g., a SNOMED CT code for Childhood Asthma to express a past health problem). Observations tend to fall into one of two categories:

1. Measured: The value of the observation is something that can be measured, and is often expressed numerically with units of measure.
2. Coded: The value of the observation is something that doesn't need to be measured, and is often expressed with codes that describe something about the patient such as the fact that they have diabetes mellitus type 2 or are a smoker.

The ResidualInfo pattern can be used to express observations where the content in the <cdsd:Name> tag corresponds to the type of observation, and the content in the <cdsd:Content> tag corresponds to the value of the observation.

Expectations for exporting EMR vendors

- Only use the NewCategory and ResidualInfo approaches when there is data that needs to be exported that cannot be mapped to patient record categories and data elements defined by EMR Data Migration Schemas.
- Exporting EMR Vendor MUST provide an electronic copy of any lookup tables or code tables that are required to interpret the meaning of any coded data provided in the ResidualInfo.

Importing EMR vendor Responsibilities

- Import the data in the NewCategory and ResidualInfo into corresponding fields in the target EMR Offering's database. If the data cannot be mapped to existing fields in the target EMR Offering, the importing EMR vendor MUST work with the physician to identify the best approach to provide electronic access to the data.

18.1.4 Other Data

Physicians often need administrative or system data migrated as part of the process of transitioning from one EMR Offering to another. While specifying how to migrate these types of data is out of scope for the EMR Data Migration Specification, this section provides some additional guidance that implements may consider.

18.1.4.1 Address Book

The contacts in physicians' address books can be expressed using the vCard format, which has several different versions that express contact details in text format. The same data can also be expressed in XML, JSON, and HTML using the xCard, jCard, and hCard formats respectively. For more information, please see: <https://en.wikipedia.org/wiki/VCard>

18.1.4.2 Billing Information

HL7 v2, v3 and FHIR describe approaches to model and express financial data. Billing information tends to be modelled as a claim. Please see the billing resource for an example of how a claim is modelled in FHIR: <https://www.hl7.org/fhir/claim.html>.

18.1.4.3 Custom Forms and Templates

There are two distinct scenarios that need to be considered when migrating custom forms and templates:

Scenario #1: Migrating the custom form or template

In this scenario, it is essentially the meta data about the custom form or template that needs to be migrated from the source EMR Offering to the target EMR Offering.

The terms “custom forms and templates” broadly cover:

- Questionnaires – collections of questions primarily intended to solicit information from patients. Questionnaires define the questions to be asked, how they are ordered, and constraints on the allowed answers. Questionnaires tend to be structured according to user-defined screens and forms, but can also be structured to express industry-wide assessments like the Rourke Baby record that are based on clinical evidence and best practices.
- Lists – sometimes referred to as check lists or order sets. The items to be selected, or the data entered, correspond to discrete data elements that already exist in the EMR Offering. This is analogous to providing a different user interface ‘view’ or ‘lens’ that allows the physician to capture the same data in a different way.
- Documents – consist of mostly free text organized into one or more sections, such as letters (e.g., an employee absentee letter) and some forms of reports (e.g., a progress note). Documents tend to have an author (e.g., the physician writing the document), a record target (e.g., the patient to whom the document refers), and an intended recipient (e.g., the person or organization that is expected to read the document).

Scenario #2: Migrating custom form or template data

In this scenario, it is the data in the questionnaires, lists or documents that needs to be migrated.

If the data is in a questionnaire or document, then the questionnaire or document as a whole must be migrated. One method for accomplishing this is to convert the questionnaire or document into a PDF document to be associated with the patient’s record. Alternatively, HL7 FHIR describes how to model and express documents, questionnaires and corresponding questionnaire responses. HL7 Clinical Document Architecture (CDA) provides another method for modelling and expressing documents. The approach taken ultimately needs to be agreed upon by the physician, exporting EMR vendor and importing EMR vendor.

Data in lists should be stored as discrete data and can be migrated as discrete data using one or more of the methods defined in this implementation guide.

18.2 Historical Data

The concept of “historical data” can be problematic during EMR data migrations. For the most part, the EMR Data Migration Schema was designed to support the expression of a current “snapshot” of patient data in XML

instances, similar to the data that would be presented to a physician in the EMR offering’s graphical user interface (GUI). Part of that current snapshot often includes what is currently known about data that represents the past (e.g., past health concerns, patient enrolment history, etc.). Conversely, some data elements have a single occurrence and are intended to represent the current value. For example, the EMR Data Migration Schema allows an XML instance to express multiple occurrences of prescriptions for a patient, but only one occurrence of the patient’s health card number.

Two common challenges implementers run into when deciding what data to migrate:

1. Status change to a health service event - Health service events like a prescription or a lab test result can go undergo several state changes in their lifecycle. For example, a prescription can be written (i.e., active) and then subsequently canceled by the prescribing physician. If the patient never received the prescription, this raises the question as to whether or not this “historical” prescription data should be migrated. Ultimately, it is up to the physician to decide what data they need migrated.
2. Data element changes - Physicians may make changes to individual data elements in their EMR Offering, including logically deleting data so that it no longer appears in the GUI. The EMR Data Migration Schema was not originally designed to express all the potential changes to individual data elements, which is normally the type of information found in an audit log.

Importing EMR vendors SHOULD NOT make assumptions about the presence or absence of different types of historical data in the XML instances they receive.

18.3 Data Mapping Guidance

EMR Offerings structure EMR data in different ways. Similarly, physicians using the same EMR Offering may choose to record similar data in different ways, with one physician opting to record information as free text and another preferring to record information as discrete and codified data. The EMR Data Migration Specification accommodates these differences by providing a flexible XML schema and business rules to accommodate various situations. This section provides additional guidance on common data mapping challenges such as:

- Source system does not support discrete data elements, but the target system uses discrete data elements.
- Source system supports granular data elements, but the data is captured mostly free text, yet the target system requires codified data.
- The field length in the source system is longer than the field length allowed for the XML instance. How do you export the data without truncating?
- The field length in the XML instance is longer than the corresponding length in the target system. How do you import without truncating?

Principle #1: The exporting EMR vendor must provide XML instances at the lowest level of granularity their product can support. Purposefully aggregating data into free text fields is NOT accepted and considered a bad practice that can have serious impacts on the lives of physicians and introduce patient safety risks to patients.

Principle #2: The importing EMR vendor should be very cautious about attempting to disaggregate data in XML instances into more granular data elements in their EMR Offering. The importing EMR vendor should follow best practices and advise the physician on the potential risks.

Principle #3: Avoid truncating text due to patient safety risks. Truncating text is considered a bad practice because it can alter the meaning of the text or cut off words that a physician needs to see to make informed decisions. Stakeholders involved in an EMR data migration should consider the following scenarios and potential resolutions:

- 1) EMR Data Export: If the source EMR Offering has a data element with more characters than are allowed by the corresponding data element defined by the EMR Data Migration Specification:
 - a) Ask the physician who made the entries if the text can be edited to be more concise prior to export.
 - b) If the text cannot be edited (e.g., the patient’s legal family name is longer than 50 characters), please contact emr@ontariomd.com to request a change to the field length.
- 2) EMR Data Import: If the target EMR Offering stores or displays data with fewer characters than are allowed by the corresponding data element defined by the EMR Data Migration Specification:
 - a) Ask the physician who made the entries if the text can be edited to be more concise prior to import.
 - b) Increase the field length in the database and/or user interface. Obviously, this is not a simple activity, especially with respect to the user interface, but it should be weighed against the patient safety concerns of alternative solutions.
 - c) Add fields to the database for ‘overflow’ data and introduce a means of indicating in the user interface that more data exists than can be displayed.

Principle #4: According to CPSO Policy, physicians are ultimately accountable for the accuracy of the data they capture about a patient. This means physicians are ultimately accountable for ensuring imported data has been placed in the appropriate fields when displayed in the user interface.

18.4 Units of Measure

Differences in the selection and representation of units of measure are often a challenge for anyone who needs to map or transform data. For example, weight can be represented using metric (e.g., kg) or imperial standards (e.g., lbs). Within a standard, systems may represent the same unit of measure differently (e.g., kg, kilograms, etc.). These challenges are exacerbated when systems need to represent ranges, with some systems representing a range as two end points (e.g., a low and high value) and others representing a median value with +/- deviation value. Unfortunately, there are no easy work-arounds to this challenge. Source systems that perform diagnostic tests are often calibrated differently and designed to represent data using different units of measure, which leads to laboratory and diagnostic imaging test results with different units of measure.

It is generally recommended to preserve the units of measure associated with any patient data in a patient record. If a conversion of the units of measure are required as part of an EMR data migration, the physician, exporting EMR vendor and importing EMR vendor should ensure the conversion does not contravene CPSO policies on record-keeping as well discuss any impacts the conversion may have on data quality and EMR functionality.

Implementers may wish to consult the Universal Codes for Units of Measure: <http://unitsofmeasure.org/trac> for additional information about different types of units of measure.

18.5 Merging Data

Stakeholders involved in migrating EMR data may encounter situations where the target EMR Offering already has some data about a patient for which there is also data in the source EMR Offering, and the data from the two sources needs to be merged. Merging patient data can be a complex and challenging activity that requires careful consideration by the physician and importing EMR vendor due to the potential patient safety risks associated with making a mistake in the merge or breaking of CPSO policies on Medical Records.

Vendors should consider assumptions physicians or EMR users may have regarding importing a single patient record using the EMR Offering's import functionality (i.e., not assisted by the vendor). For example:

- 1) If the patient is not already in the target EMR Offering, are there any steps that need to be completed first to create the start of the patient record prior to triggering the import?
- 2) If there is a patient record in the target EMR Offering, does the physician or EMR user know if:
 - a) The imported patient record replaces the entire current record in the target EMR Offering?
 - b) Patient data in the target EMR Offering that is not in the imported patient record is preserved after the import?
 - c) The target EMR Offering creates duplicate entries if there is duplicate data?

Merging can occur at the patient record level, category level, or discreet data elements within a category. Regardless of what needs to be merged, there are three basic patterns for merging data:

Pattern 1 - Source subsumes target: A decision is made that the data from the source EMR Offering should be imported and replace the duplicate data in the target EMR Offering.

Pattern 2 - Target subsumes source: A decision is made that the data from the target EMR Offering should be kept and the duplicate data in the source EMR Offering is not imported.

Pattern 3 - Target and source are combined to create a new entry that subsumes both the target and the source: in most cases this means that all the patient data in the exported XML instance will be merged into the patient record that already exists in the target system, effectively creating new entries in the patient record.

Merging can also occur at the category or data element level. This is where most of the patient safety concerns exist because decisions need to be made about which category or data element will be subsumed by the other and will the subsumed category or data element that does not survive be logically or physically deleted, or will the data be a true merge, where the categories or data elements involved in the merge both survive after the merge.

Additional tips and considerations for selecting the data to keep during merges¹.

- 1) Select the data element coming from the most trusted source. In many cases this will require the physician or their delegate to review the data and make the decision.
- 2) Pick the data which is most recently changed. For example, a most recently updated address from source A is likely preferred over an older address from a duplicate record coming from source B.
- 3) Choose the data elements which are populated with more details. For example,

¹ Amended from <http://www.mdmgeek.com/2011/12/20/combat-of-duplicate-data-who-is-the-survivor/> accessed on 2016-07-22

- a) For names, choosing Caroline over Carrie, Robert over Bob, Michael Harris over M. Harris, etc.
- b) For address, choose 1607 Chestnut Drive over 1607 Chestnut Dr.
- c) Ignore null and empty values of suspect records.

18.6 Workflow Agnostic

The data categories for Laboratory Results and Reports include elements to express reviewer and review date. Clinical Notes has elements to record signer and signed date. There is no relationship between the data elements in the different data categories. The presence of these data elements is not intended to imply any workflow regarding reports, and at times, may be a duplication of information found in one or more other data categories depending on how the physician records information in the EMR Offering. For example, if a patient record has a scanned copy of a lab test report and the physician also entered the report data into discrete lab results data elements in the EMR Offering, then the XML instance of the patient record would have the physician identified as the reviewer in both the Laboratory Results data category and the Reports data category.