National Vaccine Catalogue
FHIR API Integration Guide

2024-2025 SOP

Introduction

The National Vaccine Catalogue (NVC) is a publicly accessible information repository of all vaccines authorized for use in Canada, including product specific information and standardized terminology to promote interoperability. It is maintained by the Public Health Agency of Canada (PHAC) and is part of the Government of Canada's ongoing commitment to provide vaccine-related information to Canadian Federal, Provincial and Territorial partners, healthcare professionals and the public.

To support system to system integration between electronic health records and the NVC, the NVC system provides a public HTTP API to access the contents of the NVC database.

Nominally the implemented API is HL7's FHIR API R4, but since it does not provide a Capability Statement of which interactions and resources are supported, it is not FHIR API compliant.

Disclaimers

The data contained in the National Vaccine Catalogue is a curation from various data sources. While PHAC makes every effort to ensure the accuracy and completeness of information found in the National Vaccine Catalogue, PHAC is not responsible for the data's accuracy, completeness, interpretation, or use. PHAC actively collaborates with data partners to address and enhance data quality.

Some information normally contained in the National Vaccine Catalogue may be unavailable due to ongoing mapping updates or because the source data did not provide the information, and in some cases, the information field is blank as it may not be applicable in the given context. The information contained in the National Vaccine Catalogue may also be subject to change following data reconciliation.

Although the National Vaccine Catalogue aims to be bilingual, certain information is provided by Canada Health Infoway and not subject to the Official Languages Act and may only appear in the language in which it was written.

The National Vaccine Catalogue contains links to external information for user convenience. PHAC does not assume responsibility for the availability or content of external sites.

Download the NVC Bundle

The entire National Vaccine Catalogue can be downloaded in a single API request by sending a HTTP request to:

```
https://nvc-cnv.canada.ca/v1/Bundle/NVC
```

The NVC bundle API is the only supported API. Other examples of accessing the API endpoint:

Using the curl command line tool:

```
curl --request GET \
   --header "Accept: application/json+fhir" \
   --header "x-app-desc: PHAC NVC Client" \
   https://nvc-cnv.canada.ca/v1/Bundle/NVC
```

```
const response = await fetch(
  "https://nvc-cnv.canada.ca/v1/Bundle/NVC", {
    headers: {
       "Accept": "application/json+fhir",
       "x-app-desc": "PHAC NVC Client",
    }
  }
);
const bundle = await response.json();
console.log(bundle);
```

Using JavaScript's fetch API:

HTTP Headers

The following two HTTP headers are required:

The **Accept** header informs the server the content type of the response. The FHIR API recommends the value "application/json+fhir", the NVC server will also accept: "application/json". The "application/xml+fhir" content type is not supported, the server responds with a bad request error (HTTP 400) if the Accept header is not set properly.

The custom header **x-app-desc** contains the name of the client application initiating the HTTP request. For example: "PHAC NVC Client" or "Local EMR Client". If it is not provided the server responds with a forbidden error (HTTP 403).

The optional **If-Modified-Since** header can be provided to conditionally download the NVC bundle if a version of the catalogue was published after the provided date string (in RFC 1123 format). Otherwise the server responds with a not modified response (HTTP 304). The header and expected date format are documented on MDN web docs.

Bundle Content

The NVC bundle contains all NVC data elements in a FHIR API Bundle. The data is JSON encoded and contains the following top-level attributes:

```
{
  resourceType: "Bundle",
  id: "NVC",
  meta: { versionId: "1.10", lastUpdated: "2023-11-01T03:00:00Z" },
  type: "collection",
  entry: [
    {
      fullUrl: "https://nvc-cnv.canada.ca/v1/ValueSet/Generic",
      resource: {
        id: "Generic",
        meta: { versionId: "1.10", lastUpdated: "2024-02-16T16:36:39Z" },
        url: "https://nvc-cnv.canada.ca/v1/ValueSet/Generic",
        status: "active",
        date: "2024-02-16",
        compose: { include: [Array] },
        resourceType: "ValueSet"
      }
    },
    ...
  ]
}
```

The `resouceType`, `id` and `type` fields are fixed values. The `meta` fields contains the latest NVC release version number and the date prepared encoded as an instant datatype.

The `entry` field contains one entry for each of the following subsets, most are encoded in a FHIR API ValueSet data concept, the Vaccine lot is encoded in a Bundle.

Tradename immunizing agent

The tradename immunizing agent subset includes tradenames (representing the vaccine brand name) of authorized vaccines and passive immunizing agents (such as immunoglobulins and antitoxins, with ready-made antibodies) in Canada. This subset is a direct extension of the Canadian SNOMED CT Reference Sets developed by Canada Health Infoway. Where available, each SNOMED CT tradename is also linked to its corresponding Health Canada issued unique Drug Identification Number (DIN), lot numbers (assigned by the manufacturer to each vaccine batch), SNOMED CT generic immunization agent concept (representing the non-brand name), vaccine preventable disease concept (indicating the disease the vaccine protects against), and antigen concept (representing the active ingredient triggering an immune response).

Vaccine lot

The vaccine lot subset contains lot numbers (assigned by the manufacturer to each vaccine batch) and expiry dates (indicating the manufacturer's expiration date) for all vaccines authorized for use in Canada. Where available, each lot number is linked to its corresponding Health Canada issued unique Drug Identification Number (DIN) and SNOMED CT tradename concept (representing the vaccine brand name).

Antigen/Immunoglobulin/Antitoxin

The antigen/immunoglobulin/antitoxin subset includes reference codes for antigens (active ingredients triggering an immune response), immunoglobulins (antibodies produced in response to pathogens), and antitoxins (antibodies neutralizing toxins) found in authorized vaccines in Canada. This subset is an extension of the Pan-Canadian Immunization Reference Sets Antigen Code and Immunoglobulin Code subset developed by Canada Health Infoway.

Generic immunizing agent

The generic immunizing agent subset includes vaccines and passive immunizing agents that are currently authorized for use in Canada, those obtained through special access programs (generic description), and vaccines that have been discontinued and/or never licensed in Canada (with a tradename). This subset is a direct extension of the Canadian SNOMED CT Reference Sets developed by Canada Health Infoway. Where available, each SNOMED CT generic immunizing agent is also linked to its corresponding SNOMED CT tradename (representing the vaccine brand name), vaccine preventable disease concept (indicating the disease the vaccine protects against), and antigen concept (representing the active ingredient triggering an immune response).

Vaccine-preventable disease

The vaccine-preventable disease subset provides code references to vaccine preventable diseases. This subset is a direct extension of the Canadian SNOMED CT Reference Sets developed by Canada Health Infoway, facilitating links between Vaccine-Preventable Diseases and Antigens (Antigen Code) and Immunoglobulins (Immunoglobulin Agent Code) subsets.

Forecast status

The forecast status subset represents an individual's status with respect to their immunization guideline as of evaluation date. This is a direct extension of the Canadian SNOMED CT Reference Sets developed by Canada Health Infoway.

Immunization healthcare provider occupation

The immunization healthcare provider occupation subset describes occupations that are used to capture healthcare providers that administer immunizations. The subset has been curated specifically to capture only relevant healthcare provider occupations. This subset is a direct extension of the Canadian SNOMED CT Reference Sets developed by Canada Health Infoway.

Immunization route of administration

The immunization route of administration subset describes the path the administered immunization takes to get into the body. The subset has been curated specifically to capture only routes of administration relevant to immunization. This is a direct extension of the Canadian SNOMED CT Reference Sets developed by Canada Health Infoway.

Product Status

The product status indicates the current status of the vaccine as determined by Health Canada. This information is retrieved from Health Canada's Drug Product Database.

Administrative gender

The administrative gender subset includes the gender (representing the sex at birth) of a person used for immunization administrative purposes (as opposed to clinical gender, representing the gender identity that an individual identifies with). This is a direct extension of the Canadian SNOMED CT Reference Sets developed by Canada Health Infoway.

Table 1: Summary of NVC subsets

Subset	FHIR Type
Tradename	ValueSet
Medication (a bundle containing vaccine lots details)	Bundle
AntigenIgAntitoxin	ValueSet
Generic	ValueSet
Disease	ValueSet
ForecastStatus	ValueSet
HealthcareProviderRoleType	ValueSet
RouteOfAdmin	ValueSet
ProductStatus	ValueSet
AdminGender	ValueSet

FHIR Encoded Concepts

Designations

Used designations within the NVC FHIR bundle.

System ID	Code

http://snomed.info/sct   *900000000000003001*

    Fully specified name - SNOMED CT fully specified name representing the concept name.

http://snomed.info/sct   *900000000000013009*

    Synonym - SNOMED CT preferred name representing the concept name.

$API/v1/NamingSystem/nvc-display-terms-designation   *enDisplayTerm*

    Display term - SNOMED CT preferred name in English representing the concept name.

$API/v1/NamingSystem/nvc-display-terms-designation   *frDisplayTerm*

    Display term - SNOMED CT preferred name in French representing the concept name.

$API/v1/NamingSystem/nvc-display-terms-designation   *enAbbreviation*

    Abbreviation (en) - SNOMED CT abbreviation in English representing the immunizing agent name.

$API/v1/NamingSystem/nvc-display-terms-designation   fr*Abbreviation*

    Abbreviation (fr) - SNOMED CT abbreviation in French representing the immunizing agent name.

http://hl7.org/fhir/NamingSystem/ca-hc-din

    A Drug Identification Number (DIN) is a computer-generated eight digit number assigned by Health Canada to a drug product prior to being marketed in Canada.

Extensions

The FHIR specification allows for extensions to be added to concepts, the following are the NVC defined extensions.

Common extensions for all subsets except the *Medication B*undle.

Extension URL	Extension type
$API/v1/StructureDefinition/nvc-concept-status-extension A string (active or inactive) representing the current status of the concept.	*valueString*
$API/v1/StructureDefinition/nvc-concept-last-updated The most recent date of modification to the concept record in the NVC database.	*valueDate*

Extensions unique to *Generic* and *Tradename* ValueSet

Extension URL	Extension type
$API/v1/StructureDefinition/nvc-passive-immunizing-agent A boolean value representing whether the vaccine is a Passive Immunizing Agent, with ready-made antibodies.	*valueBoolean*

$API/v1/StructureDefinition/nvc-product-statuses   *sub-extension*

    A list of current statuses of the vaccine as determined by Health Canada.

$API/v1/StructureDefinition/nvc-product-status   *valueCodeableConcept*

    The current status of the vaccine as determined by Health Canada.

$API/v1/StructureDefinition/nvc-contains-antigens   *sub-extension*

    A list of antigens contained in the vaccine.

$API/v1/StructureDefinition/nvc-contains-antigen   *valueCodeableConcept*

    The antigen contained in the vaccine.

$API/v1/StructureDefinition/nvc-protects-against-diseases   *extension*

    A list of diseases protected by this vaccine.

$API/v1/StructureDefinition/nvc-protects-against-disease   *valueCodeableConcept*

    The disease protected by this vaccine.

Extensions defined for the *Tradename* ValueSet

Extension URL	Extension type

*$API/*v1/StructureDefinition/nvc-parent-concept   *valueCodeableConcept*

    The SNOMED CT generic parent concept code representing the non-brand name of the vaccine.

*$API/*v1/StructureDefinition/nvc-dins   *sub-extension*

    A list of DINs associated to a single tradename.

$API/v1/StructureDefinition/nvc-din   *valueCodeableConcept*

    A computer-generated eight digit number assigned by Health Canada that uniquely identifies the vaccine in Canada.

*$API/*v1/StructureDefinition/nvc-route-of-admins   *sub-extension*

    A list of the recommended routes of administration for the vaccine.

*$API/*v1/StructureDefinition/nvc-route-of-admin   *valueCodeableConcept*

    The recommended route of administration for the vaccine.

*$API/*v1/StructureDefinition/nvc-market-authorization-holders   *sub-extension*

    A list of manufacturers authorized by Health Canada for distributing the vaccine.

*$API/*v1/StructureDefinition/nvc-market-authorization-holder   *valueString*

    Manufacturer authorized by Health Canada for distributing the vaccine.

$API/v1/StructureDefinition/nvc-typical-dose-sizes-uom   *sub-extension*

    A list of units used to measure the standard dosage amounts of the vaccine.

$API/v1/StructureDefinition/nvc-typical-dose-size-uom   *valueString*

    The unit used to measure the standard dosage amount of the vaccine.

$API/v1/StructureDefinition/nvc-strengths   *sub-extension*

    A list of concentrations of the active ingredient in the vaccine.

$API/v1/StructureDefinition/nvc-strength   *valueString*

    The concentration of the active ingredient in the vaccine.

$API/v1/StructureDefinition/nvc-typical-dose-sizes   *sub-extension*

    A list of standard dosage amounts of the vaccine.

$API/v1/StructureDefinition/nvc-typical-dose-size   *valueString*

    The standard dosage amount of the vaccine.

Extensions defined for the *Medication* Bundle

Extension URL	Extension type
$API/v1/StructureDefinition/nvc-product-statuses	*sub-extension*

    A list of current statuses of the vaccine as determined by Health Canada.

*$API/*v1/StructureDefinition/nvc-product-status   *valueCodeableConcept*

    The current status of the vaccine as determined by Health Canada.

$API/v1/StructureDefinition/nvc-lots   *sub-extension*

    A list of batches of manufactured vaccines.

$API/v1/StructureDefinition/nvc-lot   *sub-extension*

    A batch of manufactured vaccines.

$API/v1/StructureDefinition/nvc-lot-number   *valueString*

    Value assigned by the manufacturer that uniquely represents each vaccine batch.

$API/v1/StructureDefinition/nvc-expiry-date   *valueDate*

    Current expiration date of the vaccine lot.

Example 1 - Fetching tradenames using JavaScript

```javascript
const api = "https://nvc-cnv.canada.ca/v1/Bundle/NVC";
const headers = {
  "Accept": "application/json+fhir",
  "x-app-desc": "NVC Client",
};

const response = await fetch(api, { headers: headers });
const bundle = await response.json();
const tradenames = bundle.entry.find((entry) => {
  return entry.fullUrl.endsWith("/v1/ValueSet/Tradename");
});
console.log(tradenames);
```

Example 2 - Extracting concept code and display value from tradenames

```javascript
// continuing previous example

const concepts = tradenames.resource.compose.include.map((t) => {
  return {
    code: t.concept[0].code,
    display: t.concept[0].display,
  };
});
console.log(concepts);

// Outputs:
[
 { code: "19291000087108", display: "Inf Xanaflu API" },
 { code: "19311000087109", display: "Men-B BEXSERO NVD" },
 { code: "19321000087101", display: "Zos ZOSTAVAX II MC" },
 { code: "19441000087102", display: "MMR-Var ProQuad MC" },
 { code: "19351000087108", display: "Men-C-ACYW-135 NIMENRIX GSK" },
 { code: "20691000087107", display: "Inf FLUZONE Quadrivalent SP" },
 { code: "20871000087109", display: "HPV-9 GARDASIL 9 MC" },
 { code: "20811000087102", display: "Inf FLULAVAL TETRA IDB" },
…
]
```

Appendix 1 - Swagger / OpenAPI Definition

```yaml
basePath: /v1
definitions:
 fhir.Bundle:
   description: Bundle a container for a collection of resources. Bundle is
     documented here http://hl7.org/fhir/StructureDefinition/Bundle
   type: object
 fhir.Medication:
   description: This resource is primarily used for the identification and
     definition of a medication for the purposes of prescribing, dispensing,
     and administering a medication as well as for making statements about
     medication use.  Medication is documented here
     http://hl7.org/fhir/StructureDefinition/Medication
   type: object
 fhir.ValueSet:
   description: A ValueSet resource instance specifies a set of codes drawn
     from one or more code systems, intended for use in a particular context.
     ValueSet is documented here
     http://hl7.org/fhir/StructureDefinition/ValueSet
   type: object
info:
 contact:
   email: NVC-CNV@phac-aspc.gc.ca
   name: PHAC NVC Administrator
 description: NVC provides a vaccine lot lookup service.
 license:
   name: National Vaccine Catalogue End-user licence agreement (EULA)
 title: National Vaccine Catalogue
 version: 1.0.2
paths:
 /Bundle/CVC:
  get:
    description: Get the entire contents of the CVC in a single bundle.
    produces:
    - application/json
    responses:
     "200":
       description: OK
       schema:
        $ref: '#/definitions/fhir.Bundle'
    summary: Get the entire CVC bundle.
    tags:
    - Bundle
schemes:
- https
- http
swagger: "2.0"
tags:
- name: Bundle
```