Immunization Calculation Engine (ICE)

Implementation Guide for Integrating with ICE

ICE versions 1.16.1, 1.17.1
Documentation Release 3.2

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Revision History

Document Revision	Date	Author	Description
Release 2.4	08/29/2014	Michael Suralik	Changed document title and file name; Minor change to description of ICE in the ICE Overview.
Release 2.5	9/12/2014	Daryl Chertcoff	Added CVX code for Influenza 2014 – 2015 Influenza season
Release 2.6	7/3/2015	Daryl Chertcoff	Added codes for DTP; Added CVX code for HPV9
Release 2.7	9/22/2015	Daryl Chertcoff	Added CVX 166 code for Influenza
Release 2.8	12/3/2015	Daryl Chertcoff	Prior documentation was missing CVX 148 and 166 in corresponding Vaccine Group section (Added 2.8). (For convenience, these changes are highlighted via Track Changes in two Tables in Section 5 of this document.)
Release 2.10	8/12/2016	Maiko Minami / Daryl Chertcoff	Update to disease immunity code mappings (ICD-10 and SNOMED-CT added)
Release 2.11	8/16/2016	Daryl Chertcoff	Added influenza vaccine codes: CVX 168, CVX 171
Release 2.12	9/23/2016	Daryl Chertcoff, Maiko Minami	Added Zoster vaccine group, vaccine; "Other" vaccine group; clarifications
Release 2.13	12/1/2016	Daryl Chertcoff	Clarified all supported disease immunity code systems (ICD-9-CM, ICD-10, and SNOMED-CT)
Release 2.14 (ICE release 1.8.1)	7/31/2017	Amy Moniz / Daryl Chertcoff / Maiko Minami	(1) Edits to combine Pneumococcal "PCV" and "PPSV" vaccine groups into one "Pneumococcal" vaccine group: "PCV" and "PPSV" vaccine groups removed from "Evaluation Focus" and "Recommendation Focus" code systems; "Pneumococcal" added (2) Added additional vaccines (CVX codes) relevant to Influenza, DTP, and Polio to CVX code system (3) Added new evaluation reason codes to "Evaluation Reasons" code system (4) Renamed "Meningococcal" vaccine group "Meningococcal ACWY"
Release 2.15 (ICE release 1.8.2)	8/2/2017	Daryl Chertcoff	Add Influenza vaccine (CVX 186)
Release 2.16 (ICE release 1.9)	9/1/2017	Amy Moniz / Daryl Chertcoff	Changes for new Meningococcal B vaccine group, ahead of ICE v. 1.9 release. This guide is a draft. It is possible (though unlikely) that additional changes

			may be made to this guide when ICE v. 1.9 is released
Release 2.17 (ICE release 1.9.1)	10/6/2017	Daryl Chertcoff	Finalized guide for 1.9.1 release. Changes since prior (2.16) guide: removed CVX 164
Release 2.18 (ICE release 1.9.2 and 1.10.1)	11/20/2017	Daryl Chertcoff	(1) CVX 148 incorrectly listed twice under Hib vaccine group. (2) Fixed incorrect definition as previously defined in this document for the response payload's "isValid" element. The prior definition and examples incorrectly stated that an ACCEPTED shot's "isValid" element will be marked true. An ACCEPTED shot's isValid element is false. The corrected definition states that isValid is only true if the shot is VALID.
Release 2.19 (ICE release 1.11.1)	3/9/2018	Amy Moniz / Daryl Chertcoff / Maiko Minami	Information on how to read the Earliest Date and Past Due Date (*a.k.a.* "overdue" date)
Release 2.20 (ICE release 1.12.1)	4/12/2018	Daryl Chertcoff	(1) Addition of 3 vaccines/CVX codes for Zoster and Hep B. See pp. 52-61 (2) New evaluation reason code. See p. 64
Release 3.1 (ICE release 1.15.1)	2/1/2019	Amy Moniz / Daryl Chertcoff	(1) New evaluation reason code – SELECT_ADJUVANT_PRODUCT_INTERVAL. See p. 65
Release 3.2 (ICE releases 1.16.1, 1.17.1)	3/7/2019 5/31/2019	Amy Moniz / Daryl Chertcoff	New recommendation reason code – TOO_OLD_TO_INITIATE. See p. 67

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1 ICE Documentation

The most complete source of information about the Immunization Calculation Engine (ICE) is the official ICE Wiki which is publicly accessible at: http://www.cdsframework.org. Any future releases of this document will be posted on that website.

In addition, HLN Consulting, LLC publishes some ICE information at: https://www.hln.com/ice.

2 Purpose of this Document

The purpose of this document is to describe what steps must be taken for a client application to invoke the ICE Web Service. This document describes the format of the data that must be passed to the service, and the format of the data that is passed back from the service. This document also provides guidance on how to interpret the information populated in the message structure.

Note that the code systems and code values specified in this document are specific to the default configuration of ICE (i.e. the "out of the box" rules that are shipped with ICE). An ICE deployment that has been configured with different rules might use different code systems and values, but the structure of the ICE messages will stay the same.

3 ICE Overview

The **Immunization Calculation Engine** (**ICE**) is a state-of-the-art open-source software system that provides clinical decision support for immunizations (CDSi), commonly referred to as "immunization forecasting".

ICE has two major components:

- The **ICE Web Service** evaluates a patient's immunization history and generates the appropriate immunization recommendations for the patient
- The **Clinical Decision Support Administration Tool** (**CAT**) is a web-based GUI tool that enables subject matter experts to manage ICE rules and configuration without the intervention of software developers.

Organizations may freely adopt ICE due to its open source license and complete lack of dependence on any commercial software. The ICE software system has been publicly released as an open-source software system, under the GNU Lesser General Public License v3 (LGPL v3). Through its standards-based Web Service interface, ICE easily integrates with third party clinical information systems such as electronic health record systems (EHR-S), patient portals, immunization information systems (IIS), school health systems, and health information exchanges (HIEs) - regardless of their software architecture (.NET, Java, or other). Because of ICE's Java-based implementation, it can be deployed in diverse technical environments.

The ICE software system has been developed and configured by a collaborative partnership of public health and information technology experts from the New York City Department of Health and Mental Hygiene, Citywide Immunization Registry (CIR); HLN Consulting, LLC; the Alabama Department of Public Health (ADPH); and the OpenCDS collaboration led by researchers at the University of Utah, Department of Biomedical Informatics.

The ICE Web Service has been implemented as a clinical module within **OpenCDS**, an open-source software framework that provides developers with a set of tools for implementing clinical decision support services. More information about OpenCDS can be found at: http://www.opencds.org.

ICE comes pre-configured with the childhood, adolescent, and adult immunization schedules for routinely administered vaccine groups. The pre-configured ICE rules are thoroughly documented on the publicly accessible ICE Wiki at: https://cdsframework.atlassian.net/wiki/spaces/ICE/pages/14352468/Default+Immunization+Schedule. These rules are based on the recommendations of the Advisory Committee on Immunization Practices (ACIP) as interpreted by a team of subject matter experts from the CIR, ADPH, and HLN.

However, any organization may configure ICE to suit its own needs and can adapt ICE as new vaccines come to market and as the recommendations of the ACIP change. Non-technical subject matter experts may manage and configure ICE through the web-based **Clinical Decision Support Administration Tool (CAT)**. ICE can scale to support multiple immunization schedules. For example, a single ICE deployment could enforce one immunization schedule utilized by multiple EHR-S, another immunization schedule used by an IIS, and a third immunization schedule utilized by a school health system.

4 Communicating with the ICE Service

Clinical information systems may utilize ICE by making SOAP Web Service calls to the ICE Web Service. The interface of the ICE Web Service conforms to the Decision Support Service (DSS) standard which specifies the technical capabilities and interfaces of a decision support service. The DSS standard has been specified by both HL7 International and the Object Management Group (OMG).

To communicate with the ICE Web Service, clinical information systems must send and receive XML-formatted data that conforms to the Virtual Medical Record (vMR) standard. The vMR standard was developed by the HL7 Clinical Decision Support Workgroup and is a data model and message specification format for representing clinical data relevant to a clinical decision support service. The workgroup strived to develop as flexible of a format as possible by drawing upon the collective CDS expertise of its members, an examination of the data requirements of 20 CDS systems across 4 nations, as well as applicable HL7 standards that already existed.

HLN chose the vMR specification for ICE's inputs and outputs in order to support the project's overarching goal of enabling non-technical subject matter experts to create and maintain immunization evaluation and forecasting rules without the assistance of a software developer. If new data elements are ever needed to support new types of rules, the vMR should be able to support this. In addition, the vMR standard continues to be actively worked on and updated by the HL7 community, enabling new and better ways of representing clinical information in a standardized format.

Below is a high level summary of the inputs and outputs to the ICE Web Service. The inputs and outputs are specified in much greater detail throughout the remainder of this document.

Inputs

- Date of birth
- Gender
- Immunization history
- Disease indicators
- Identification of which ICE rule set to utilize (ICE comes pre-configured with one rule set)
- Date of evaluation

Outputs

- Evaluation of each dose in the immunization history
- Reason for evaluation
- Recommendation for each vaccine group
- Reason for recommendation
- If configured, number of doses remaining in the series

4.1 Invoking ICE as a Decision Support Service

Client applications invoke the ICE service by way of SOAP method calls conforming to the Decision Support Service (DSS) standards.

Although OpenCDS itself implements several DSS operations, ICE currently only makes use of two operations within the Evaluate Interface: `evaluate` and `evaluateAtSpecifiedTime`. Callers should use `evaluate` if they would like ICE to evaluate the immunizations and make recommendations based on the current date, and use `evaluateAtSpecifiedTime` if they would like ICE to evaluate and recommend with respect to a specified date. The ICE TestManager tool always utilizes the latter operation. In the case that forecasting should occur with respect to today's date, the TestManager simply specifies today's date.

When constructing the SOAP invocation request using the `evaluateAtSpecifiedTime` operation, the following are the WSDL and SOAP action parameters:

- Service is "DecisionSupportService"
- Port is "evaluate"
- Operation is "evaluateAtSpecifiedTime"
- URL is [location of the ICE3 service]. The exact URL will vary depending on your application server software and where you install ICE. As an example, if ICE is unpacked as `opencds-decision-support-service` in Tomcat's webapp directory, the URL is simply "http://<hostname>/opencds-decision-support-service/evaluate"
- SOAP action is "http://www.omg.org/spec/CDSS/201105/dssWsdl:operation:evaluateAtSpecifiedTime"

In the DSS request, it is necessary to tell ICE which immunization schedule should be used. Since only one immunization schedule has been configured at this point, specify the following attributes for the `<kmEvaluationRequest><kmId>` node:

- `scopingEntityId="org.nyc.cir"`
- `businessId="ICE"`
- `version="1.0.0"`

In the DSS request, it is necessary to tell ICE which version of the VMR message format to use. Specify the below attribute values for the `<kmEvaluationRequest><dataRequirementItemData><data><informationModelSSId>` node:

- `scopingEntityId="org.opencds.vmr"`
- `businessId="VMR"`
- `version="1.0"`

In the DSS request, base64 encode the contents of the VMR message within `<kmEvaluationRequest><dataRequirementItemData><data><base64EncodedPayload>`.

Following the above guidelines, a complete SOAP request will look like the following:

```
<?xml version='1.0' encoding='UTF-8'?>
<S:Envelope xmlns:S="http://www.w3.org/2003/05/soap-envelope">
    <S:Body>
```

```
        <ns2:evaluateAtSpecifiedTime
xmlns:ns2="http://www.omg.org/spec/CDSS/201105/dss">
            <interactionId scopingEntityId="gov.nyc.health"
interactionId="123456"/>
            <specifiedTime>2012-01-14T00:00:00.000-05:00</specifiedTime>
            <evaluationRequest clientLanguage="" clientTimeZoneOffset="">
                <kmEvaluationRequest>
                    <kmId scopingEntityId="org.nyc.cir" businessId="ICE"
version="1.0.0"/>
                </kmEvaluationRequest>
                <dataRequirementItemData>
                    <driId itemId="cdsPayload">
                        <containingEntityId scopingEntityId="gov.nyc.health"
businessId="ICEData" version="1.0.0.0"/>
                    </driId>
                    <data>
                        <informationModelSSId
scopingEntityId="org.opencds.vmr" businessId="VMR" version="1.0"/>
<base64EncodedPayload>BASE64_ENCODED_VMR_MESSAGE</base64EncodedPayload>
                    </data>
                </dataRequirementItemData>
            </evaluationRequest>
        </ns2:evaluateAtSpecifiedTime>
    </S:Body>
</S:Envelope>
```

4.2 Virtual Medical Record Format (VMR)

All messages to and from the ICE service conform to version 1.0 of the vMR. The vMR 1.0 XML Schema Definition files are required for client application development. These XSD files can be downloaded from the ICE Wiki's Technical Documentation page, which is at the following URL: https://cdsframework.atlassian.net/wiki/display/CDSF/Technical+Documentation. In addition, there are links on this page to sample clients for interacting with the ICE Web Service. The sample clients are written in Java and C# and are a good starting point for writing your own ICE client. (The source code projects are stored in a Bitbucket repository and they also include the aforementioned XSD files.)

This document describes the aspects of the vMR that are relevant to ICE, including identifying essential ICE data elements and vocabulary. It should be all that's needed to successfully interface with the ICE Web Service. The implementer may also find it useful to import the vMR XSD files into an XML editor to understand the general structure of the vMR input and output messages, or to review the vMR Domain Analysis Model. The Domain Analysis Model is also available for download from the Technical Documentation page of the ICE Wiki.

4.3 ICE Input Message

The vMR input message must specify basic demographic information about the patient and his or her immunization history. The demographic information consists of the patient's birthdate and gender. The immunization history consists of the complete set of shots administered to the patient during his/her lifetime, and a record (if any) of disease immunity for that patient.

The ICE-specific immunization input message conforms to the `cdsInput.xsd`, and the XML template on the next page.

- XML messages must follow the ordering and structure of this template. The order of elements should not deviate from the template.
- Wherever there is a <root/> element, **the ID supplied must be unique** and **cannot be repeated** for any other <root/> element in the message.
- Some elements may not be present in all messages or may repeat, as described in the comments of the template as well as in the XSD.
- Wherever a code system value, templateId value, or other value is specified in this template, that same value must be used at that location for *all* messages sent to the service.
- Values in set brackets (*i.e.* – "{..}") must be supplied by the calling application.
- Refer to the Input Node Elements and Attributes Section

4.3.1 Input Message Format

```
<!-- Message Begins -->
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<!-- CDSInput Section Begins (mandatory) -->
<ns4:cdsInput xmlns:ns2="org.opencds" xmlns:ns3="org.opencds.vmr.v1_0.schema.vmr"
xmlns:ns4="org.opencds.vmr.v1_0.schema.cdsinput" xmlns:ns5="org.opencds.vmr.v1_0.schema.cdsoutput">
    <templateId root="2.16.840.1.113883.3.795.11.1.1"/>
    <!-- CDSContext Section Begins (mandatory) -->
    <cdsContext>
        <!-- Specify user Preferred Language -->
        <cdsSystemUserPreferredLanguage code="en" codeSystem="2.16.840.1.113883.6.99"
displayName="English"/>
    </cdsContext>
    <!-- CDSContext Section Ends -->
    <!-- vMR Input Section Begins (mandatory) -->
    <vmrInput>
        <templateId root="2.16.840.1.113883.3.795.11.1.1"/>
        <!-- Patient Input Section Begins (mandatory) -->
        <patient>
            <templateId root="2.16.840.1.113883.3.795.11.2.1.1"/>
            <id root="{UNIQUE_ROOT_ID}" extension="{UNIQUE_ROOT_EXTENSION}"/> <!-- root & extension
attributes appended together must be unique across all root & root/extension values for the entire
message. The unique identifier cannot be repeated anywhere in the message. Suggestion: use the
Globally Unique Identifer (GUID) algorithm to generate the root attribute value only and do not
bother specifying the extension. Example GUID value: 0368a1b4-0f93-402e-841d-e0b02943300d -->
            <!-- Patient Birthdate and Gender Section Begins (mandatory) -->
            <demographics>
                <birthTime value="{YYYYMMDD}"/>   <!-- e.g. February 29, 2012 would be specified by
20120229 -->
                <gender code="{GENDER_CODE}" codeSystem="2.16.840.1.113883.5.1"
displayName="{Optional_Value}"/>
            </demographics>
            <!-- Patient Birthdate and Gender Section Ends -->
            <clinicalStatements>
                <!-- Patient Disease Immunity Section Begins (optional) -->
                <observationResults>
                    <observationResult>
                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
```

```
                        <id root="{UNIQUE_IDENTIFIER2}"/>  <!-- Suggestion: Use Globally Unique
Identifier algorithm (GUID) -->
                        <observationFocus code="{DISEASE_IMMUNITY_FOCUS_CODE}"
codeSystem="2.16.840.1.113883.6.103" displayName=".." originalText=".."/>  <!—codeSystem may be OID
for ICD-9-CM, SNOMED-CT, or ICD-10. See Disease code tables -->

                        <!-- ObservationEventTime low and high attributes are dates in YYYYMMDD
format, and they must be the same value -->
                        <observationEventTime low="{YYYYMMDD}" high="{YYYYMMDD}"/>
                        <observationValue>
                            <concept code="{DISEASE_DOCUMENTATION_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.8" displayName=".." originalText=".."/>
                        </observationValue>
                        <interpretation code="{DISEASE_IMMUNITY_INTERPRETATION_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.9" displayName=".." originalText=".."/>
                    </observationResult>
                    <observationResult>
                        [Record another disease immunity information here if necessary …]
                    </observationResult>
                    <observationResult>
                        [Record another disease immunity information here if necessary …]
                    </observationResult>
                </observationResults>
                <!-- Patient Disease Immunity Section Ends -->
                <!-- List of Vaccines Administered Begins (optional) -->
                <substanceAdministrationEvents>
                    <!-- Shot number #1 Begin -->
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="{UNIQUE_IDENTIFIER3}"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="{UNIQUE_IDENTIFIER4}"/>
                            <substanceCode code="{CVX_CODE}" codeSystem="2.16.840.1.113883.12.292"
displayName=".." originalText=".."/>
                        </substance>
                        <administrationTimeInterval low="{YYYYMMDD}" high="{YYYYMMDD}"/>
                    </substanceAdministrationEvent>
                    <!-- Shot number #1 End -->
```

```
                    <!-- Shot number #2 Begin -->
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="{UNIQUE_IDENTIFIER5}"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="{UNIQUE_IDENTIFIER6}"/>
                            <substanceCode code="{CVX_CODE}" codeSystem="2.16.840.1.113883.12.292"
displayName=".." originalText=".."/>
                        </substance>
                        <administrationTimeInterval low="{YYYYMMDD}" high="{YYYYMMDD}"/>
                    </substanceAdministrationEvent>
                    <!-- Shot number #2 End -->
                    <!-- Shot number #3 Begin -->
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="{UNIQUE_IDENTIFIER7}"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="{UNIQUE_IDENTIFIER8}"/>
                            <substanceCode code="{CVX_CODE}" codeSystem="2.16.840.1.113883.12.292"
displayName=".." originalText=".."/>
                        </substance>
                        <administrationTimeInterval low="{YYYYMMDD}" high="{YYYYMMDD}"/>
                    </substanceAdministrationEvent>
                    <!-- Shot number #3 End -->
                    <!-- Shot number 4 Begin -->
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="{UNIQUE_IDENTIFIER9}"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="{UNIQUE_IDENTIFIER10}"/>
                            <substanceCode code="{CVX_CODE}" codeSystem="2.16.840.1.113883.12.292"
displayName=".." originalText=".."/>
                        </substance>
                        <administrationTimeInterval low="{YYYYMMDD}" high="{YYYYMMDD}"/>
```

```
                    </substanceAdministrationEvent>
                    <!-- Shot number 4 End -->
                </substanceAdministrationEvents>
                <!-- List of Vaccines Administered Ends -->
            </clinicalStatements>
        </patient>
        <!-- Patient Input Section Ends -->
    </vmrInput>
    <!-- VMR Input Section Ends -->
</ns4:cdsInput>
<!-- CDSInput Section Ends -->
<!-- Message Ends -->
```

4.3.2 Sample Input Message

Below is a sample XML message with the values populated.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ns4:cdsInput xmlns:ns2="org.opencds" xmlns:ns3="org.opencds.vmr.v1_0.schema.vmr"
xmlns:ns4="org.opencds.vmr.v1_0.schema.cdsinput" xmlns:ns5="org.opencds.vmr.v1_0.schema.cdsoutput">
    <templateId root="2.16.840.1.113883.3.795.11.1.1"/>
    <cdsContext>
        <cdsSystemUserPreferredLanguage code="en" codeSystem="2.16.840.1.113883.6.99"
displayName="English"/>
    </cdsContext>
    <vmrInput>
        <templateId root="2.16.840.1.113883.3.795.11.1.1"/>
        <patient>
            <templateId root="2.16.840.1.113883.3.795.11.2.1.1"/>
            <id root="2.16.840.1.113883.3.795.12.100.11" extension="92"/>
            <demographics>
                <birthTime value="19900101"/>
                <gender code="M" codeSystem="2.16.840.1.113883.5.1" displayName="Male"
originalText="M"/>
            </demographics>
            <clinicalStatements>
                <observationResults>
                    <observationResult>
                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                        <id root="617478b8-b6eb-4988-853a-b5f5c2441eb8"/>
```

```
                        <observationFocus code="070.30" codeSystem="2.16.840.1.113883.6.103"
displayName="Hepatitis B" originalText="070.30"/>
                        <observationEventTime low="19960315" high="19960315"/>
                        <observationValue>
                            <concept code="DISEASE_DOCUMENTED"
codeSystem="2.16.840.1.113883.3.795.12.100.8" displayName="Disease Documented"
originalText="DISEASE_DOCUMENTED"/>
                        </observationValue>
                        <interpretation code="IS_IMMUNE"
codeSystem="2.16.840.1.113883.3.795.12.100.9" displayName="Is Immune" originalText="IS_IMMUNE"/>
                    </observationResult>
                </observationResults>
                <substanceAdministrationEvents>
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="2.16.840.1.113883.3.795.12.100.10" extension="230"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="6095733e-a576-44a2-b314-26a23e1ff6b6"/>
                            <substanceCode code="45" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB NOS" originalText="45"/>
                        </substance>
                        <administrationTimeInterval low="19900315" high="19900315"/>
                    </substanceAdministrationEvent>
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="2.16.840.1.113883.3.795.12.100.10" extension="229"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="c4361cf7-4387-4072-a55e-5bac066813ad"/>
                            <substanceCode code="45" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB NOS" originalText="45"/>
                        </substance>
                        <administrationTimeInterval low="19900401" high="19900401"/>
                    </substanceAdministrationEvent>
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="2.16.840.1.113883.3.795.12.100.10" extension="228"/>
```

```
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="84e18c21-1a07-4347-b7fd-96f052a39ef6"/>
                            <substanceCode code="08" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB peds &lt; 20yrs" originalText="08"/>
                        </substance>
                        <administrationTimeInterval low="19960315" high="19960315"/>
                    </substanceAdministrationEvent>
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="2.16.840.1.113883.3.795.12.100.10" extension="227"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="fca8d517-9541-4f80-adbd-1528b3963360"/>
                            <substanceCode code="08" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB peds &lt; 20yrs" originalText="08"/>
                        </substance>
                        <administrationTimeInterval low="20100201" high="20100201"/>
                    </substanceAdministrationEvent>
                </substanceAdministrationEvents>
            </clinicalStatements>
        </patient>
    </vmrInput>
</ns4:cdsInput>
```

4.3.3 Input Node Elements and Attributes

The table below lists the XML nodes and attributes that may be utilized in the input message. Usage notes are provided. Some attribute values are coded; the complete set of accepted code values is listed in the Code Tables section of this document.

Attribute	Datatype	Required?	Usage
<cdsInput> This section is *always* provided			
<templateId root>	UUID	Y	Set to "2.16.840.1.113883.3.795.11.1.1"

Attribute	Datatype	Required?	Usage
<cdsInput><cdsContext> This section is *always* provided			
<cdsSystemUserPreferredLanguage code>	String	Y	Set to "en"
<cdsSystemUserPreferredLanguage codeSystem	UUID	Y	Set to "2.16.840.1.113883.6.99"
<cdsInput><vmrInput> This section is *always* provided			
<templateId root>	UUID	Y	Set to "2.16.840.1.113883.3.795.11.1.1"
<cdsInput><vmrInput><patient> This section is *always* provided			
<templateId root>	UUID	Y	Set to "2.16.840.1.113883.3.795.11.2.1.1"
<id root>	UUID	Y	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<cdsInput><vmrInput><patient><demographics> This section is *always* provided with the birthdate and gender of the patient			
<birthTime value>	TS	Y	Birthdate of the patient. Set to a timestamp value with the format YYYYMMDD.
<gender code>	String	Y	Gender of the patient. Set as "M" for Male or "F" for Female.
<gender codeSystem>	UUID	Y	Codesystem used by ICE to interpret gender.code. Set to "2.16.840.1.113883.5.1".
<gender displayName>	String	N	Display name for Gender. Not used by ICE
<gender originalText>	String	N	Original Text name for Gender. Not used by ICE
<cdsInput><vmrInput><patient><clinicalStatements> This section is *always* provided.			
<cdsInput><vmrInput><patient><clinicalStatements><observationResults> This section is *optionally* provided to specify all instances of disease immunity for the patient. Each instance of disease immunity is specified by an <observationResult> section			

Attribute	Datatype	Required?	Usage
<cdsInput><vmrInput><patient><clinicalStatements><observationResults><observationResult> Repeated for each instance of disease immunity, if any.			
<templateId root>	UUID	Y	Set to "2.16.840.1.113883.3.795.11.6.3.1"
<id root>	UUID	Y	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<observationFocus code>	String	Y	Code value specifying the focus of the observation. Refer to the code table for the below codeSystem for valid values. See Disease code tables for supported values.
<observationFocus codeSystem>	UUID	Y	Code System used by ICE to interpret the above observationFocus code. Code System may be OID for ICD-9-CM, SNOMED-CT, or ICD-10.
<observationEventTime low>	TS	Y	Time that the disease immunity was recorded. Set to a timestamp value with the format YYYYMMDD
<observationEventTime high>	TS	Y	Time that the disease immunity was recorded. Set to the same timestamp value as observationEventTime.low (format YYYYMMDD)
<interpretation code>	String	Y	Interpretation element is repeatable. Code value specifying how ICE should interpret the nested <observationValue>. Refer to the code table for the below codeSystem for valid values
<interpretation codeSystem>	UUID	Y	Interpretation element is repeatable. Code System used by ICE to interpret the above interpretation code. Set to "2.16.840.1.113883.3.795.12.100.9"
<interpretation displayName>	String	N	Interpretation element is repeatable. Display name corresponding with the above interpretation code. Not used by ICE.
<interpretation originalText>	String	N	Interpretation element is repeatable. Original text name corresponding with the above interpretation code. Not used by ICE.
<cdsInput><vmrInput><patient><clinicalStatements><observationResults><observationResult><observationValue> Required section if ancestor <observationResult> section is present.			

Attribute	Datatype	Required?	Usage
<concept code>	String	Y	Code value specifying the value for the above <observationFocus/>. Since <observationResults/> are only specified in the input message for disease immunity, this code will always have something to do with disease immunity. Refer to the code table for the below codeSystem for valid values.
<concept codeSystem>	UUID	Y	Code System used by ICE to interpret the above concept code. Set to "2.16.840.1.113883.3.795.12.100.8"
<concept displayName>	String	N	Display name corresponding with the above observation value code. Not used by ICE.
<concept originalText>	String	N	Original text corresponding to the above observation value code. Not used by ICE.
<cdsInput><vmrInput><patient><clinicalStatements><substanceAdministrationEvents> This section is *optional*. Specified when there are shots that have been administered. They are reported to ICE as a part of the patient's immunization history. Each instance of an administered shot is specified by a <substanceAdministrationEvent> section			
<cdsInput><vmrInput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent> Repeated for each instance of an administered shot.			
<templateId root>	UUID	Y	Set to "2.16.840.1.113883.3.795.11.9.1.1"
<id root>	UUID	Y	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<substanceAdministrationGeneralPurpose code>	String	Y	Set to "384810002"
<substanceAdministrationGeneralPurpose codeSystem>	UUID	Y	Set to "2.16.840.1.113883.6.5"
<administrationTimeInterval low>	TS	Y	Date that a shot was administered. Set to a timestamp value with the format YYYYMMDD
<administrationTimeInterval high>	TS	Y	Date that a shot was administered. Set to the same timestamp value as administrationTimeInterval.low (format YYYYMMDD)

Attribute	Datatype	Required?	Usage
<cdsInput><vmrInput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent><substance> Required if ancestor <substanceAdministrationEvent/> section is present			
<id root>	UUID	Y	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<substanceCode code>	String	Y	CVX code of the vaccine administered
<substanceCode codeSystem>	UUID	Y	Set to "2.16.840.1.113883.12.292", the OID for CVX codes
<substanceCode displayName>	String	N	Display name corresponding with the above CVX code. Not used by ICE.

Attribute	Datatype	Required?	Usage
<substanceCode originalText>	String	N	Original text corresponding with the above CVX code. Not used by ICE.

4.4 ICE Output Message

When producing the output of evaluations and recommendations to the client, ICE will first mirror what was provided in the VMR input message and then supplements the provided information with additional elements and attributes. In some cases, where additional nested output is conveyed, ICE will do so by adding <relatedClinicalStatement/> nodes.

The ICE-specific immunization output message conforms to the `cdsOutput.xsd`, and the XML template on the next page.

- XML messages must follow the ordering and structure of this template. The order of elements do not deviate from the template.
- Some elements may not be present in all messages or may repeat, as described in the comments of the template as well as in the XSD.
- Refer to the Output Node Elements and Attributes Section for additional usage information.

4.4.1 Output Message Format

```
<!-- Message Begins -->
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<!-- CDSOutput Section Begins (always present) -->
<ns5:cdsOutput xmlns:ns2="org.opencds" xmlns:ns3="org.opencds.vmr.v1_0.schema.vmr"
xmlns:ns4="org.opencds.vmr.v1_0.schema.cdsinput" xmlns:ns5="org.opencds.vmr.v1_0.schema.cdsoutput">
    <!-- VMR Output Section Begins (always present) -->
    <vmrOutput>
        <templateId root="2.16.840.1.113883.3.795.11.1.1"/>
        <!-- Patient Output Section Begins (always present) -->
        <patient>
            <templateId root="2.16.840.1.113883.3.795.11.2.1.1"/>
            <id root="{UNIQUE_IDENTIFIER1}"/>
            <!-- Patient Birthdate and Gender Section Begins (always present; no differences from input
message) -->
            <demographics>
                <birthTime value="{YYYYMMDD}"/>
                <gender code="{GENDER_CODE}" codeSystem="2.16.840.1.113883.5.1" displayName="…"
originalText="…"/>
            </demographics>
            <!-- Patient Birthdate and Gender Section Ends -->
            <clinicalStatements>
                <!-- Patient Disease Immunity Section Begins (only present if provided on input; no
differences from input message) -->
                <observationResults>
                    <observationResult>
                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                        <id root="{UNIQUE_IDENTIFIER2}"/>
                        <observationFocus code="{DISEASE_IMMUNITY_FOCUS_CODE"
codeSystem="2.16.840.1.113883.6.103" displayName="…" originalText="…"/>
                        <observationEventTime low="{YYYYMMDD}" high="{YYYYMMDD}"/>
                        <observationValue>
                            <concept code="{DISEASE_DOCUMENTATION_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.8" displayName="…" originalText="…"/>
                        </observationValue>
                        <interpretation code="{DISEASE_IMMUNITY_INTERPRETATION_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.9" displayName="…" originalText="…"/>
                    </observationResult>
```

```
                    <observationResult>
                        [Output of another disease immunity record here if necessary …]
                    </observationResult>
                    <observationResult>
                        [Output of another disease immunity record here if necessary …]
                    </observationResult>
                </observationResults>
                <!-- Patient Disease Immunity Section Ends -->
                <!-- List of Vaccines Administered Section Begins. Note that each
<SubstanceAdministrationEvent/> provided in the input message is also listed in this output -->
                <substanceAdministrationEvents>
                    <!-- SubstanceAdministrationEvent for administered vaccine #1; evaluation information
is added by ICE -->
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="{UNIQUE_IDENTIFIER3}"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="{UNIQUE_IDENTIFIER4}"/>
                            <!-- Vaccine code supplied by client application; note that this could be a
composite vaccine -->
                            <substanceCode code="{CVX_CODE}" codeSystem="2.16.840.1.113883.12.292"
displayName="…" originalText="…"/>
                        </substance>
                        <administrationTimeInterval low="{YYYYMMDD}" high="{YYYYMMDD}"/>
                        <!-- Evaluation Information Section Begins; this <relatedClinicalStatement/> is
repeated for each component vaccine implemented in ICE -->
                        <relatedClinicalStatement>
                            <targetRelationshipToSource code="PERT" codeSystem="2.16.840.1.113883.5.1002"/>
                            <substanceAdministrationEvent>
                                <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                                <id root="{UNIQUE_IDENTIFIER5}"/>
                                <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                                <substance>
                                    <id root="{UNIQUE_IDENTIFIER6}"/>
                                    <!-- Component Vaccine in focus within this
<relatedClinicalStatement/>; note that if the vaccine supplied by the client application is not a composite
vaccine, this vaccine code will be the same as the above -->
```

```
                                    <substanceCode code="{CVX_CODE}" codeSystem="2.16.840.1.113883.12.292"
displayName="…" originalText="…"/>
                                </substance>
                                <administrationTimeInterval low="{YYYYMMDD}" high="{YYYYMMDD}"/>
                                <!-- Validity of Component Vaccine; true if VALID or ACCEPTED, false if
INVALID. This summary value is supplied for convenience only; it is strongly recommended that the client
application use the below nested <relatedClinicalStatement/> for validity information -->
                                <isValid value="{TRUE_OR_FALSE}"/>
                                <relatedClinicalStatement>
                                    <targetRelationshipToSource code="PERT"
codeSystem="2.16.840.1.113883.5.1002"/>
                                    <!-- Component Vaccine Validity Information -->
                                    <observationResult>
                                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                                        <id root="{UNIQUE_IDENTIFIER7}"/>
                                        <!-- ObservationFocus to specify which component was evaluated  -->
                                        <observationFocus code="{IMMUNIZATION_VALIDITY_FOCUS}"
codeSystem="2.16.840.1.113883.3.795.12.100.1" displayName="…" originalText="…"/>
                                        <!-- ObservationValue to specify validity of component vaccine
(i.e. VALID, ACCEPTED, or INVALID) -->
                                        <observationValue>
                                            <concept code="{VALIDITY_VALUE}"
codeSystem="2.16.840.1.113883.3.795.12.100.2" displayName="…" originalText="…"/>
                                        </observationValue>
                                        <!-- Optional (repeatable) interpretation element specify why a
vaccine is VALID, INVALID or ACCEPTED -->
                                        <interpretation code="{REASON_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.3" displayName="…" originalText="…"/>
                                        <interpretation code="{REASON_CODE2}"
codeSystem="2.16.840.1.113883.3.795.12.100.3" displayName="…" originalText="…"/>
                                    </observationResult>
                                </relatedClinicalStatement>
                            </substanceAdministrationEvent>
                        </relatedClinicalStatement>
                        <!-- Evaluation Information Section Ends for this component vaccine -->
                        <!-- Evaluation Information Section Begins for next component vaccine (if any) -->
                        <relatedClinicalStatement>
                            ...
                        </relatedClinicalStatement>
                        <!-- Evaluation Information Section Ends for this component vaccine -->
```

```
                    </substanceAdministrationEvent>
                    <!-- SubstanceAdministrationEvent Section Ends for this administered vaccine -->
                    <!-- SubstanceAdministrationEvent Section Begins for next administered vaccine #2, #3,
etc. (if any) -->
                    <substanceAdministrationEvent>
                        ...
                    </substanceAdministrationEvent>
                    <!-- SubstanceAdministrationEvent Section Ends for this administered vaccine -->
                </substanceAdministrationEvents>
                <!-- List of Vaccines Administered Section Ends -->
                <!-- ICE Recommendations Section Begins (always present). Note that each
<SubstanceAdministrationProposal/> corresponds to a recommendation for 1 vaccine group -->
                <substanceAdministrationProposals>
                    <!-- SubstanceAdministrationProposal for vaccine group #1 -->
                    <substanceAdministrationProposal>
                        <templateId root="2.16.840.1.113883.3.795.11.9.3.1"/>
                        <id root="{UNIQUE_IDENTIFIER8}"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="{UNIQUE_IDENTIFIER9}"/>
                            <!– substanceCode specifies the vaccine or vaccine group for this
recommendation. If a specific vaccine is recommended, ICE will populate this with a CVX code. More
commonly, this attribute will be populated with the vaccine group code using code system
2.16.840.1.113883.3.795.12.100.1 as in the example below In this example, substanceCode specifies the
vaccine group for this recommendation -->
                            <substanceCode code="{VACCINE_GROUP_OR_VACCINE_SPECIFIC_CODE}"
codeSystem="<2.16.840.1.113883.12.292 if vaccine> or < 2.16.840.1.113883.3.795.12.100.1 if vaccine group>"
displayName="…" originalText="…"/>
                        </substance>
                        <!-- <relatedClinicalStatement/> contains the recommendation forecast and
associated reasons for the vaccine group specified by the below <observationFocus/> element -->
                        <relatedClinicalStatement>
                            <targetRelationshipToSource code="RSON" codeSystem="2.16.840.1.113883.5.1002"/>
                            <observationResult>
                                <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                                <id root="{UNIQUE_IDENTIFIER10}"/>
                                <!-- observationFocus specifies the vaccine group for this recommendation -
->
```

```
                                <observationFocus code="{VACCINE_GROUP_RECOMMENDATION_FOCUS_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.1" displayName="…" originalText="…"/>
                                <!-- observationValue specifies the recommendation; currently either
RECOMMENDED, FUTURE_RECOMMENDED, CONDITIONALLY_RECOMMENDED or NOT_RECOMMENDED -->
                                <observationValue>
                                    <concept code="{RECOMMENDATION_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.5" displayName="…" originalText="…"/>
                                </observationValue>
                                <!-- Optional (repeatable) interpretation element specify why the reason
for the above recommendation value -->
                                <interpretation code="{RECOMMENDATION_REASON_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.6" displayName="…" originalText="…"/>
                            </observationResult>
                        </relatedClinicalStatement>
                    </substanceAdministrationProposal>
                    <!-- SubstanceAdministrationProposal Section Ends for vaccine group #1 -->
                    <!-- SubstanceAdministrationProposal for vaccine group #2 -->
                    <substanceAdministrationProposal>
                        <templateId root="2.16.840.1.113883.3.795.11.9.3.1"/>
                        <id root="{UNIQUE_IDENTIFIER11}"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="{UNIQUE_IDENTIFIER12}"/>
                            <!– substanceCode specifies the vaccine or vaccine group for this
recommendation. If a specific vaccine is recommended, ICE will populate this with a CVX code. More
commonly, this attribute will be populated with the vaccine group code using code system
2.16.840.1.113883.3.795.12.100.1 as in the example below In this example, substanceCode specifies the
vaccine group for this recommendation -->
                            <substanceCode code="{VACCINE_GROUP_OR_VACCINE_SPECIFIC_CODE}"
codeSystem="<2.16.840.1.113883.12.292 if vaccine> or < 2.16.840.1.113883.3.795.12.100.1 if vaccine group>"
displayName="…" originalText="…"/>
                        </substance>
                        <!-- <relatedClinicalStatement/> contains the recommendation forecast and
associated reasons for the vaccine group specified by the below <observationFocus/> element -->
                        <relatedClinicalStatement>
                            <targetRelationshipToSource code="RSON" codeSystem="2.16.840.1.113883.5.1002"/>
                            <observationResult>
                                <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                                <id root="{UNIQUE_IDENTIFIER13}"/>
```

```
                                <!-- observationFocus specifies the vaccine group for this recommendation.
-->
                                <observationFocus code="{VACCINE_RECOMMENDATION_FOCUS_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.1" displayName="…" originalText="…"/>
                                <!-- observationValue specifies the recommendation; currently either
RECOMMENDED, FUTURE_RECOMMENDED, CONDITIONALLY_RECOMMENDED or NOT_RECOMMENDED -->
                                <observationValue>
                                    <concept code="{RECOMMENDATION_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.5" displayName="…" originalText="…"/>
                                </observationValue>
                                <!-- Optional (repeatable) interpretation element specify why the reason
for the above recommendation value -->
                                <interpretation code="{RECOMMENDATION_REASON_CODE}"
codeSystem="2.16.840.1.113883.3.795.12.100.6" displayName="…" originalText="…"/>
                            </observationResult>
                        </relatedClinicalStatement>
                    </substanceAdministrationProposal>
                    <!-- SubstanceAdministrationProposal Section Ends for vaccine group #2 -->
                    <!-- SubstanceAdministrationProposal Section Repeated for remaining vaccine group
                         or vaccine-specific recommendations -->
                    <substanceAdministrationProposal>
                        ...
                    </substanceAdministrationProposal>
                    <!-- SubstanceAdministrationProposal Section Ends -->
                </substanceAdministrationProposals>
                <!-- ICE Recommendations Section Ends -->
            </clinicalStatements>
        </patient>
        <!-- Patient Output Section Ends -->
    </vmrOutput>
    <!-- VMR Output Section Ends -->
</ns5:cdsOutput>
<!-- CDSOutput Section Ends -->
<!-- Message Ends -->
```

4.4.2 Sample Output Message

The following sample output shows the evaluations for 4 administered shots and one accompanying Hep B recommendation. The patient was born on 1/1/1990. Disease immunity was documented on 3/15/1996 and the test was executed when the patient's age was 21 years, 11 months and 11 days old (*i.e.* – 8015 days). (Recall that ICE will evaluate and forecast at a specified time via the DSS `evaluatedAtSpecifiedTime` operation.)

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ns5:cdsOutput xmlns:ns2="org.opencds" xmlns:ns3="org.opencds.vmr.v1_0.schema.vmr"
xmlns:ns4="org.opencds.vmr.v1_0.schema.cdsinput" xmlns:ns5="org.opencds.vmr.v1_0.schema.cdsoutput">
    <vmrOutput>
        <templateId root="2.16.840.1.113883.3.795.11.1.1"/>
        <patient>
            <templateId root="2.16.840.1.113883.3.795.11.2.1.1"/>
            <id root="2.16.840.1.113883.3.795.12.100.11" extension="92"/>
            <demographics>
                <birthTime value="19900101"/>
                <gender code="M" codeSystem="2.16.840.1.113883.5.1" displayName="Male" originalText="M"/>
            </demographics>
            <clinicalStatements>
                <observationResults>
                    <observationResult>
                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                        <id root="617478b8-b6eb-4988-853a-b5f5c2441eb8"/>
                        <observationFocus code="070.30" codeSystem="2.16.840.1.113883.6.103"
displayName="Hepatitis B" originalText="070.30"/>
                        <observationEventTime low="19960315" high="19960315"/>
                        <observationValue>
                            <concept code="DISEASE_DOCUMENTED"
codeSystem="2.16.840.1.113883.3.795.12.100.8" displayName="Disease Documented"
originalText="DISEASE_DOCUMENTED"/>
                        </observationValue>
                        <interpretation code="IS_IMMUNE" codeSystem="2.16.840.1.113883.3.795.12.100.9"
displayName="Is Immune" originalText="IS_IMMUNE"/>
                    </observationResult>
                </observationResults>
                <substanceAdministrationEvents>
                    <substanceAdministrationEvent>
```

```
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="2.16.840.1.113883.3.795.12.100.10" extension="230"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="1094b5c2-03f7-472d-bf62-989138841492"/>
                            <substanceCode code="45" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB NOS" originalText="45"/>
                        </substance>
                        <administrationTimeInterval low="19900315" high="19900315"/>
                        <relatedClinicalStatement>
                            <targetRelationshipToSource code="PERT" codeSystem="2.16.840.1.113883.5.1002"/>
                            <substanceAdministrationEvent>
                                <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                                <id root="7de6fc89-f6a7-4926-ad84-82708d87aaff"/>
                                <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                                <substance>
                                    <id root="4d0ea31e-04ac-4bd7-8fbf-3e1f7423b5e0"/>
                                    <substanceCode code="45" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB NOS" originalText="45"/>
                                </substance>
                                <administrationTimeInterval low="19900315" high="19900315"/>
                                <isValid value="true"/>
                                <relatedClinicalStatement>
                                    <targetRelationshipToSource code="PERT"
codeSystem="2.16.840.1.113883.5.1002"/>
                                    <observationResult>
                                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                                        <id root="6c360bc7-afb8-4585-823e-f3297db42048"/>
                                        <observationFocus code="100"
codeSystem="2.16.840.1.113883.3.795.12.100.1" displayName="Immunization Validity (Hep B Component)"
originalText="100"/>
                                        <observationValue>
                                            <concept code="VALID"
codeSystem="2.16.840.1.113883.3.795.12.100.2" displayName="Valid Immunization" originalText="VALID"/>
                                        </observationValue>
                                    </observationResult>
                                </relatedClinicalStatement>
                            </substanceAdministrationEvent>
```

```
                        </relatedClinicalStatement>
                    </substanceAdministrationEvent>
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="2.16.840.1.113883.3.795.12.100.10" extension="229"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="7bc7d976-1d21-458f-b0ea-21262a1314db"/>
                            <substanceCode code="45" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB NOS" originalText="45"/>
                        </substance>
                        <administrationTimeInterval low="19900401" high="19900401"/>
                        <relatedClinicalStatement>
                            <targetRelationshipToSource code="PERT" codeSystem="2.16.840.1.113883.5.1002"/>
                            <substanceAdministrationEvent>
                                <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                                <id root="b84dd4d8-c942-443a-911e-424834327bca"/>
                                <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                                <substance>
                                    <id root="a8bca109-4b9f-4186-a4f5-8053d74c4a51"/>
                                    <substanceCode code="45" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB NOS" originalText="45"/>
                                </substance>
                                <administrationTimeInterval low="19900401" high="19900401"/>
                                <isValid value="false"/>
                                <relatedClinicalStatement>
                                    <targetRelationshipToSource code="PERT"
codeSystem="2.16.840.1.113883.5.1002"/>
                                    <observationResult>
                                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                                        <id root="b088d0e5-05e4-4aa5-8067-dba69a79e4f1"/>
                                        <observationFocus code="100"
codeSystem="2.16.840.1.113883.3.795.12.100.1" displayName="Immunization Validity (Hep B Component)"
originalText="100"/>
                                        <observationValue>
                                            <concept code="INVALID"
codeSystem="2.16.840.1.113883.3.795.12.100.2" displayName="Invalid Immunization" originalText="INVALID"/>
                                        </observationValue>
```

```
                                        <interpretation code="BELOW_MINIMUM_INTERVAL"
codeSystem="2.16.840.1.113883.3.795.12.100.3" displayName="Below Minimum Interval"
originalText="BELOW_MINIMUM_INTERVAL"/>
                                    </observationResult>
                                </relatedClinicalStatement>
                            </substanceAdministrationEvent>
                        </relatedClinicalStatement>
                    </substanceAdministrationEvent>
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="2.16.840.1.113883.3.795.12.100.10" extension="228"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="85818577-26e6-49a0-bd64-8062518b40da"/>
                            <substanceCode code="08" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB peds &lt; 20yrs" originalText="08"/>
                        </substance>
                        <administrationTimeInterval low="19960315" high="19960315"/>
                        <relatedClinicalStatement>
                            <targetRelationshipToSource code="PERT" codeSystem="2.16.840.1.113883.5.1002"/>
                            <substanceAdministrationEvent>
                                <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                                <id root="6d32bcec-4244-4e89-8d17-62097b775714"/>
                                <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                                <substance>
                                    <id root="7c8035f2-d860-4b80-8b9e-5673d3ba6c36"/>
                                    <substanceCode code="08" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB peds &lt; 20yrs" originalText="08"/>
                                </substance>
                                <administrationTimeInterval low="19960315" high="19960315"/>
                                <isValid value="false"/>
                                <relatedClinicalStatement>
                                    <targetRelationshipToSource code="PERT"
codeSystem="2.16.840.1.113883.5.1002"/>
                                    <observationResult>
                                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                                        <id root="d792be0e-1037-4d09-93e6-25ce729d93e0"/>
```

```
                                        <observationFocus code="100"
codeSystem="2.16.840.1.113883.3.795.12.100.1" displayName="Immunization Validity (Hep B Component)"
originalText="100"/>
                                        <observationValue>
                                            <concept code="ACCEPTED"
codeSystem="2.16.840.1.113883.3.795.12.100.2" displayName="Accepted Immunization" originalText="ACCEPTED"/>
                                        </observationValue>
                                        <interpretation code="PROOF_OF_IMMUNITY"
codeSystem="2.16.840.1.113883.3.795.12.100.3" displayName="Proof of Immunity"
originalText="PROOF_OF_IMMUNITY"/>
                                    </observationResult>
                                </relatedClinicalStatement>
                            </substanceAdministrationEvent>
                        </relatedClinicalStatement>
                    </substanceAdministrationEvent>
                    <substanceAdministrationEvent>
                        <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                        <id root="2.16.840.1.113883.3.795.12.100.10" extension="227"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="20ce1691-1e81-4af6-8c25-e40773159cd2"/>
                            <substanceCode code="08" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB peds &lt; 20yrs" originalText="08"/>
                        </substance>
                        <administrationTimeInterval low="20100201" high="20100201"/>
                        <relatedClinicalStatement>
                            <targetRelationshipToSource code="PERT" codeSystem="2.16.840.1.113883.5.1002"/>
                            <substanceAdministrationEvent>
                                <templateId root="2.16.840.1.113883.3.795.11.9.1.1"/>
                                <id root="efaf05b0-6664-47fa-9fad-0a7a68f48049"/>
                                <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                                <substance>
                                    <id root="6a2b2fb2-a55a-4919-9937-a5af77fa400a"/>
                                    <substanceCode code="08" codeSystem="2.16.840.1.113883.12.292"
displayName="HepB peds &lt; 20yrs" originalText="08"/>
                                </substance>
                                <administrationTimeInterval low="20100201" high="20100201"/>
                                <isValid value="false"/>
```

```
                                <relatedClinicalStatement>
                                    <targetRelationshipToSource code="PERT"
codeSystem="2.16.840.1.113883.5.1002"/>
                                    <observationResult>
                                        <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                                        <id root="46ef3a8c-da1c-4c2f-943a-513552494a46"/>
                                        <observationFocus code="100"
codeSystem="2.16.840.1.113883.3.795.12.100.1" displayName="Immunization Validity (Hep B Component)"
originalText="100"/>
                                        <observationValue>
                                            <concept code="ACCEPTED"
codeSystem="2.16.840.1.113883.3.795.12.100.2" displayName="Accepted Immunization" originalText="ACCEPTED"/>
                                        </observationValue>
                                        <interpretation code="PROOF_OF_IMMUNITY"
codeSystem="2.16.840.1.113883.3.795.12.100.3" displayName="Proof of Immunity"
originalText="PROOF_OF_IMMUNITY"/>
                                    </observationResult>
                                </relatedClinicalStatement>
                            </substanceAdministrationEvent>
                        </relatedClinicalStatement>
                    </substanceAdministrationEvent>
                </substanceAdministrationEvents>
                <substanceAdministrationProposals>
                    <substanceAdministrationProposal>
                        <templateId root="2.16.840.1.113883.3.795.11.9.3.1"/>
                        <id root="88758294-7f20-4491-aaae-6450fb1fb3fc"/>
                        <substanceAdministrationGeneralPurpose code="384810002"
codeSystem="2.16.840.1.113883.6.5"/>
                        <substance>
                            <id root="2a048d0b-e15e-46f0-9008-397742e90afa"/>
                            <substanceCode code="100" codeSystem="2.16.840.1.113883.3.795.12.100.1"
displayName="Immunization Recommendation Focus (Hep B)" originalText="100"/>
                        </substance>
                        <relatedClinicalStatement>
                            <targetRelationshipToSource code="RSON" codeSystem="2.16.840.1.113883.5.1002"/>
                            <observationResult>
                                <templateId root="2.16.840.1.113883.3.795.11.6.3.1"/>
                                <id root="f8592ea2-22b4-4619-bb4b-8a4865753561"/>
                                <observationFocus code="100" codeSystem="2.16.840.1.113883.3.795.12.100.1"
displayName="Immunization Recommendation Focus (Hep B)" originalText="100"/>
```

```
                                <observationValue>
                                    <concept code="NOT_RECOMMENDED"
codeSystem="2.16.840.1.113883.3.795.12.100.5" displayName="Not Recommended"
originalText="NOT_RECOMMENDED"/>
                                </observationValue>
                                <interpretation code="PROOF_OF_IMMUNITY"
codeSystem="2.16.840.1.113883.3.795.12.100.6" displayName="Proof of Immunity"
originalText="PROOF_OF_IMMUNITY"/>
                            </observationResult>
                        </relatedClinicalStatement>
                    </substanceAdministrationProposal>
                </substanceAdministrationProposals>
            </clinicalStatements>
        </patient>
    </vmrOutput>
</ns5:cdsOutput>
```

4.4.3 Output Node Elements and Attributes

The table below lists the XML nodes and attributes that are utilized in the output message. Notice that the output message structure contains much of what was provided on input, with additional elements and attributes encompassing evaluations and forecasts. Usage notes are provided. Some attribute values are coded.

The complete set of accepted code values is listed in the Code Tables section of this document. Refer to the Output Message Format Section for a description on the structure of the output message.

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<cdsOutput> This section is *always* provided				
<templateId root>	UUID	Y	Y	Set to "2.16.840.1.113883.3.795.11.1.1"
<cdsOutput><vmrOutput> This section is *always* provided				

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<templateId root>	UUID	Y	Y	Set to "2.16.840.1.113883.3.795.11.1.1"
<cdsOutput><vmrOutput><patient> This section is *always* provided				
<templateId root>	UUID	Y	Y	Set to "2.16.840.1.113883.3.795.11.2.1.1"
<id root>	UUID	Y	Y	UUID used to form a unique value across all id elements for the message. May be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	Y	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<cdsOutput><vmrOutput><patient><demographics> This section is *always* provided with the birthdate and gender of the patient				
<birthTime value>	TS	Y	Y	Birthdate of the patient. Set to a timestamp value with the format YYYYMMDD.
<gender code>	String	Y	Y	Gender of the patient. Set as "M" for Male or "F" for Female.
<gender codeSystem>	UUID	Y	Y	Codesystem used by ICE to interpret gender.code. Set to "2.16.840.1.113883.5.1".
<gender displayName>	String	N	Y	Display name for Gender. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<gender originalText>	String	N	Y	Original Text name for Gender. In the future, functionality may be added to ICE to support client-customizable original-text names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements> This section is *always* provided.				

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<cdsOutput><vmrOutput><patient><clinicalStatements><observationResults> This section is *optionally* provided to specify all instances of disease immunity for the patient. Each instance of disease immunity is specified by an <observationResult> section				
<cdsOutput><vmrOutput><patient><clinicalStatements><observationResults><observationResult> Repeated for each instance of disease immunity, if any.				
<templateId root>	UUID	Y	Y	Set to "2.16.840.1.113883.3.795.11.6.3.1"
<id root>	UUID	Y	Y	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	Y	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<observationFocus code>	String	Y	Y	Code value specifying the focus of this observation related to disease immunity. Refer to the code table for the below codeSystem for valid values.
<observationFocus codeSystem>	UUID	Y	Y	Code System used by ICE to interpret the above observationFocus code. This should have been set to "2.16.840.1.113883.6.103" by the client application for disease immunity focus.
<observationEventTime low>	TS	Y	Y	Date that the disease immunity was recorded. Set to a timestamp value with the format YYYYMMDD
<observationEventTime high>	TS	Y	Y	Date that the disease immunity was recorded. Set to the same timestamp value as observationEventTime.low (format YYYYMMDD)

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<interpretation code>	String	Y	Y	Interpretation element is repeatable. Code value specifying how ICE interpreted the nested <observationValue> with respect to disease immunity. Refer to the code table for the below codeSystem for valid values
<interpretation codeSystem>	UUID	Y	Y	Interpretation element is repeatable. Code System used by ICE to interpret the above interpretation code. This should have been set to "2.16.840.1.113883.3.795.12.100.9" by the client application for disease immunity interpretation.
<interpretation displayName>	String	N	Y	Interpretation element is repeatable. Display name corresponding with the above interpretation code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<interpretation originalText>	String	N	Y	Interpretation element is repeatable. Original text name corresponding with the above interpretation code. In the future, functionality may be added to ICE to support client-customizable original-text names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements><observationResults><observationResult><observationValue> Required section if ancestor <observationResult> section is present.				
<concept code>	String	Y	Y	Code value specifying the disease immunity value for the above <observationFocus/>. Refer to the code table for the below codeSystem for valid values.
<concept codeSystem>	UUID	Y	Y	Code System used by ICE to interpret the above concept code. Set to "2.16.840.1.113883.3.795.12.100.8"

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<concept displayName>	String	N	Y	Display name corresponding with the above observation value code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<concept originalText>	String	N	Y	Original text corresponding to the above observation value code. In the future, functionality may be added to ICE to support client-customizable original-text names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents> This section is *optional*. Specified when there are shots that have been administered. They are reported to ICE as a part of the patient's immunization history. Each instance of an administered shot is specified by a <substanceAdministrationEvent> section				
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent> Repeated for each instance of an administered shot.				
<templateId root>	UUID	Y	Y	Set to "2.16.840.1.113883.3.795.11.9.1.1"
<id root>	UUID	Y	Y	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	Y	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<substanceAdministrationGeneralPurpose code>	String	Y	Y	Set to "384810002"
<substanceAdministrationGeneralPurpose codeSystem>	UUID	Y	Y	Set to "2.16.840.1.113883.6.5"
<administrationTimeInterval low>	TS	Y	Y	Date that the shot was administered. Set to a timestamp value with the format YYYYMMDD

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<administrationTimeInterval high>	TS	Y	Y	Date that the shot was administered. Set to the same timestamp value as administrationTimeInterval.low (format YYYYMMDD)
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent><substance> Required if ancestor <substanceAdministrationEvent/> section is present				
<id root>	UUID	Y	Y	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	Y	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<substanceCode code>	String	Y	N	CVX code of the vaccine administered. In future versions of ICE, this value will be the same as that in the input message.
<substanceCode codeSystem>	UUID	Y	N	ICE sets this to "2.16.840.1.113883.12.292", the OID for CVX codes.
<substanceCode displayName>	String	N	N	Display name corresponding with the above CVX code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<substanceCode originalText>	String	N	N	Original text corresponding with the above CVX code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent><relatedClinicalStatement> This element was not provided on input but is present on output for its ancestor <substanceAdministrationEvent/>. It is included to list evaluation information for a component vaccine. Repeatable for each component vaccine of the administered shot.				
<targetRelationshipToSource code>	String	Y	N/A	Set to "PERT"

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<targetRelationshipToSource codeSystem>	UUID	Y	N/A	Set to "2.16.840.1.113883.5.1002"
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent><relatedClinicalStatement><substanceAdministrationEvent>				
<templateId root>	UUID	Y	N/A	Set to "2.16.840.1.113883.3.795.11.9.1.1"
<id root>	UUID	Y	N/A	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	N/A	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<substanceAdministrationGeneralPurpose code>	String	Y	N/A	ICE sets this to "384810002"
<substanceAdministrationGeneralPurpose codeSystem>	UUID	Y	N/A	ICE sets this to "2.16.840.1.113883.6.5"
<administrationTimeInterval low>	TS	Y	Y	Date that a shot was administered. ICE sets the date value in the format YYYYMMDD
<administrationTimeInterval high>	TS	Y	Y	Date that the shot was administered. Set to the same date value as administrationTimeInterval.low (format YYYYMMDD)
<isValid value>	boolean	N	N/A	Set to true if component vaccine evaluated as VALID; false if anything other than VALID
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent><relatedClinicalStatement><substanceAdministrationEvent><substance> This element was not provided on input but is present on output if ancestor <substanceAdministrationEvent/> is present. This section indicates the component vaccine in question and it is not repeatable.				

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<id root>	UUID	Y	N/A	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	N/A	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<substanceCode code>	String	Y	N	CVX code of the component vaccine.
<substanceCode codeSystem>	UUID	Y	N	ICE sets this to "2.16.840.1.113883.12.292", the OID for CVX codes
<substanceCode displayName>	String	N	N	Display name corresponding with the above CVX code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<substanceCode originalText>	String	N	N	Original text corresponding with the above CVX code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent><relatedClinicalStatement><substanceAdministrationEvent><relatedClinicalStatement> This element was not provided on input but is present on output for its ancestor <substanceAdministrationEvent/>. It is a continuation of evaluation information for the component vaccine and not repeated.				
<targetRelationshipToSource code>	String	Y	N/A	Set to "PERT"
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent><relatedClinicalStatement><substanceAdministrationEvent><relatedClinicalStatement><observationResult> Continuation of evaluation information for the component vaccine and not repeatable.				
<templateId root>	UUID	Y	N/A	Set to "2.16.840.1.113883.3.795.11.6.3.1"

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<id root>	UUID	Y	N/A	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	N/A	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<observationFocus code>	String	Y	N/A	Code value specifying the focus of this observation related to evaluation of this component vaccine. Refer to the code table for the below codeSystem for valid values.
<observationFocus codeSystem>	UUID	Y	N/A	Code System used by ICE to interpret the above observationFocus code. Set to "2.16.840.1.113883.3.795.12.100.1" which indicates the vaccine group component that is being evaluated. (*e.g.* - "Immunization Validity (Hep B Component)")
<interpretation code>	String	N	N/A	Interpretation element is repeatable. The code value specifies how ICE should interpret the nested <observationValue>. Refer to the code table for the below codeSystem for valid values
<interpretation codeSystem>	UUID	N	N/A	Interpretation element is repeatable. Set to "2.16.840.1.113883.3.795.12.100.3"
<interpretation displayName>	String	N	N/A	Interpretation element is repeatable. Display name corresponding with the above interpretation code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<interpretation originalText>	String	N	N/A	Interpretation element is repeatable. Original text name corresponding with the above interpretation code. In the future, functionality may be added to ICE to support client-customizable original-text names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationEvents><substanceAdministrationEvent><relatedClinicalStatement><substanceAdministrationEvent><relatedClinicalStatement><observationResult><observationValue> Continuation of evaluation information for the component vaccine and not repeatable.				
<concept code>	String	Y	N/A	Code value specifying the evaluation validity with respect to the above <observationFocus/>. That is, is the component vaccine VALID, INVALID, etc.? Refer to the code table for the below codeSystem for valid values.
<concept codeSystem>	UUID	Y	N/A	Code System used by ICE to interpret the above concept code. ICE sets this to "2.16.840.1.113883.3.795.12.100.2"
<concept displayName>	String	N	N/A	Display name corresponding with the above observation value code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<concept originalText>	String	N	N/A	Original text corresponding to the above observation value code. In the future, functionality may be added to ICE to support client-customizable original-text names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationProposals> This section is *optional*. Specified when there are vaccine forecasts. Vaccine forecasts are broken up by vaccine group, and each vaccine group recommendation is specified by a <substanceAdministrationProposal> section				
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationProposals><substanceAdministrationProposal> Repeated for each vaccine group recommendation.				
<templateId root>	UUID	Y	N/A	ICE sets this to "2.16.840.1.113883.3.795.11.9.3.1"

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<id root>	UUID	Y	N/A	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	N/A	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<substanceAdministrationGeneralPurpose code>	String	Y	N/A	ICE sets this to "384810002"
<substanceAdministrationGeneralPurpose codeSystem>	UUID	Y	N/A	Set to "2.16.840.1.113883.6.5"
<proposedAdministrationTimeInterval low>	TS	N	N/A	If a vaccine is due to be administered on a particular date, this element attribute is included in the output and represents the *recommended date*. ICE sets the date in the YYYYMMDD format. Implementations should always obtain the recommended date from this attribute, and not the "high" attribute (specified below).

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<proposedAdministrationTimeInterval high>	TS	N	N/A	If a vaccine is due to be administered on a particular date *and* the "output_earliest_and_overdue_dates" property is set to "Y" in the ice.properties file, this element attribute is included in the output and represents the *past due date (a.k.a. - overdue date)*. The past due date is the date after which an immunization administered would be considered late. ICE sets the date in the YYYYMMDD format. If there is no past due date, this attribute is not included. *Note:* If the "output_earliest_and_overdue_dates" property is *not* set to "Y" in the ice.properties file, this attribute is set to the recommended date (*i.e.* – the same date as the "low" attribute specified above). This is done for backwards compatibility to previous implementations of ICE. However, moving forward, applications should be sure to obtain the earliest recommended date from the "low" attribute only.

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<validAdministrationTimeInterval low>	TS	N	N/A	If a vaccine is due to be administered on a particular date *and* the "output_earliest_and_overdue_dates" property is set to "Y" in the ice.properties file, this element is included in the output and represents the *earliest date*. The earliest due date is the earliest date that the vaccine can be given and still be considered valid. ICE sets the date in the YYYYMMDD format.
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationProposals><substanceAdministrationProposal><substance> Continuation of the vaccine forecast within its ancestor <substanceAdministrationProposal>. This element is not repeatable.				
<id root>	UUID	Y	N/A	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<id extension>	String	N	N/A	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<substanceCode code>	String	Y	N/A	Vaccine or vaccine group code being recommended. If a specific vaccine is recommended, ICE will populate this with a CVX code. More commonly, this attribute will be populated with the vaccine group.
<substanceCode codeSystem>	UUID	Y	N/A	The codeSystem representing the vaccine group for which this recommendation is being made. Currently, ICE sets this to "2.16.840.1.113883.3.795.12.100.1" if a vaccine group; "2.16.840.1.113883.12.292" if a vaccine. Note that the calling application must also look at the nested <relatedClinicalStatement> to get all of the parameters for the forecast.
<substanceCode displayName>	String	N	N/A	Display name corresponding with the above CVX or vaccine group code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<substanceCode originalText>	String	N	N/A	Original text corresponding with the above CVX or vaccine group code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationProposals><substanceAdministrationProposal><relatedClinicalStatement> This element is a continuation of the vaccine forecast within its ancestor <substanceAdministrationProposal> and contains the forecast				
<targetRelationshipToSource code>	String	Y	N/A	ICE always sets this to "RSON"
<targetRelationshipToSource codeSystem>	UUID	Y	N/A	ICE always sets this to "2.16.840.1.113883.5.1002"

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationProposals><substanceAdministrationProposal><relatedClinicalStatement><observationResult> This element is a continuation of the vaccine forecast within its ancestor <relatedClinicalStatement>. It indicates the vaccine group in question and also indicates the reasons for the recommendation in the nested <observationValue>. It is not repeatable.				
<templateId root>	UUID	Y	N/A	ICE always sets this to "2.16.840.1.113883.3.795.11.6.3.1"
<id root>	UUID	Y	N/A	UUID used to form a unique value across all id elements for the message. Can be combined with id.extension attribute (below) to form uniqueness if desired.
<id extension>	String	N	N/A	Character string that when appended to the id.root attribute forms a unique value for the message. If id.root is unique on its own, this attribute is not required.
<observationFocus code>	String	Y	N/A	Vaccine group code for which this recommendation is being made.
<observationFocus codeSystem>	UUID	Y	N/A	This codeSystem attribute will be set to "2.16.840.1.113883.3.795.12.100.1", which indicates the vaccine group for which the recommendation is being made. (*e.g.* - "Immunization Recommendation Focus (Hep B)").
<interpretation code>	String	Y	N/A	Interpretation element is repeatable. The code value specifies how ICE should interpret the nested <observationValue>. Refer to the code table for the below codeSystem for valid values

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<interpretation codeSystem>	UUID	Y	N/A	Interpretation element is repeatable. ICE always set this to "2.16.840.1.113883.3.795.12.100.6". Note: Until Release 1.9.1, at most one Interpretation element was returned for each SubstanceAdministrationProposal. The Meningococcal B vaccine group, introduced in 1.9.1, may return multiple Interpretation elements for its SubstanceAdministrationProposal.
<interpretation displayName>	String	N	N/A	Interpretation element is repeatable. Display name corresponding with the above interpretation code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.
<interpretation originalText>	String	N	N/A	Interpretation element is repeatable. Original text name corresponding with the above interpretation code. In the future, functionality may be added to ICE to support client-customizable original-text names for use by the client.
<cdsOutput><vmrOutput><patient><clinicalStatements><substanceAdministrationProposals><substanceAdministrationProposal><relatedClinicalStatement><observationResult><observationValue> This element is a continuation of the vaccine forecast within its ancestor <observationResult>. It specifies whether a shot is recommended, not recommended, conditionally recommended, etc. It is not repeatable.				
<concept code>	String	Y	N/A	Code value specifying the recommendation with respect to the above <observationFocus/>. Refer to the code table for the below codeSystem for valid values.
<concept codeSystem>	UUID	Y	N/A	Code System used by ICE to interpret the above concept code. ICE sets this to "2.16.840.1.113883.3.795.12.100.5"

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<concept displayName>	String	N	N/A	Display name corresponding with the above observation value code. In the future, functionality may be added to ICE to support client-customizable display names for use by the client.

Attribute	Datatype	Always Present?	Value Same as in Input Message?	Usage
<concept originalText>	String	N	N/A	Original text corresponding to the above observation value code. In the future, functionality may be added to ICE to support client-customizable original-text names for use by the client.

5 Code Tables

Below are the code systems and values that are used in ICE's input and output messages. When constructing or processing messages, client applications should use the code values in the tables below.

5.1 Vaccines

5.1.1 CVX - Code System 2.16.840.1.113883.12.292

Below is a list of the CVX codes accepted by this version of ICE. See following tables in this section for mapping of these vaccines to those accepted by each vaccine group.

Code Value	Description
01	DTP
02	OPV
03	MMR
04	Measles/Rubella
05	Measles
06	Rubella
07	Mumps
08	Hep B Peds < 20 years
09	Td adult (absorbed)
10	IPV
15	Influenza, Split
16	Influenza, Whole
17	Hib NOS
20	DTaP
21	Varicella
22	DTP-Hib (Tetramune; OmniHib-DTP)
28	DT (pediatric
31	HepA Pediatric NOS
32	Meningococcal MPSV4 (Menomune)
33	Pneumococcal Polysaccharide 23 valent
38	Mumps/Rubella
46	Hib-PRP-D (ProHIBIT)
47	Hib-HbOC (HibTITER)
48	Hib-PRP-T (ActHIB, Hiberix)
49	Hib-PRP-OMP (PedvaxHIB)
42	Hep B High Risk Infant
43	Hep B Adult >= 20 years

Code Value	Description
44	Hep B Dialysis
45	Hep B NOS
50	DTaP-Hib (TriHiBit)
51	Hep B-Hib (PRP-OMP (ComVAX))
52	Hep A Adult
62	HPV Quadrivalent (Gardasil)
74	Rotavirus
83	HepA ped/adol 2 dose
84	HepA pediatric/adolescent (3 dose)
85	HepA NOS
88	Influenza, unspecified formulation
89	Polio, unspecified formulation
94	MMR-Varicella
100	Pneumococcal Conjugate 7 valent (PCV 7)
102	DTP-Hib-HepB
104	Twinrix
106	DTaP, 5 pertussis antigens
107	DTaP, unspecified formulation
108	Meningococcal, unspecified formulation
109	Pneumococcal NOS
110	DTaP/HepB/IPV
111	influenza, live, intranasal
113	Td (adult) preservative free
114	Meningococcal MCV4P (Menactra)
115	Tdap
116	Rotavirus RV5 (RotaTeq, 3-dose)
118	HPV Bivalent (Cervarix)
119	Rotavirus RV1 (Rotarix, 2-dose)
120	DTaP-Hib (PRP-T)-IPV
121	Zoster vaccine, live
122	Rotavirus NOS
125	Novel Influenza-H1N1-09, nasal
126	Novel influenza-H1N1-09, preservative-free
127	Novel influenza-H1N1-09
128	Novel Influenza-H1N1-09, all formulations
130	DTaP/IPV
132	DTaP-IPV-Hib-HepB, Historical
133	Pneumococcal Conjugate 13 (PCV 13)
135	Influenza, high dose, seasonal
136	Meningococcal MCV4O (Menveo)
137	HPV NOS
138	Td (adult, not adsorbed)
139	Td, adult NOS
140	Influenza, seasonal, injectable, preservative free

Code Value	Description
141	Influenza, seasonal, injectable
144	Influenza, seasonal, intradermal, preservative free
146	DTaP-IPV-Hib-HepB
147	Meningococcal MCV4, unspecified formulation
148	Mening C&Y-Hib PRP-T (Menhibrix) (Only Hib component evaluated)
149	Influenza, live, intranasal, quadrivalent
150	Influenza, injectable, quadrivalent, preservative free
151	Influenza nasal, unspecified formulation
153	Influenza, injectable, MDCK, preservative free
155	Influenza, injectable, MDCK, preservative free
158	Influenza-IIV4, IM (>3yrs)
161	Influenza, injectable, quadrivalent, preservative free, pediatric
162	Meningococcal B FHbp, recombinant (Trumenba)
163	Meningococcal B 4C, OMV (Bexsero)
164	Meningococcal B, NOS
165	HPV9
166	Influenza, intradermal, quadrivalent, preservative free, injectable
168	Seasonal trivalent influenza vaccine, adjuvanted, preservative free
170	DTaP-IPV-Hib
171	Influenza, injectable, Madin Darby Canine Kidney, preservative free, quadrivalent
178	OPV bivalent
179	OPV ,monovalent, unspecified (NOS)
182	OPV, Unspecified (NOS)
185	Influenza, recombinant, quadrivalent, injectable, preservative free
186	Influenza, injectable, MDCK, quadrivalent
187	Zoster vaccine recombinant
188	Zoster vaccine, unspecified formulation (NOS)
189	Hep B, adjuvanted

5.1.2 Vaccines by Vaccine Group

5.1.2.1 Hep A

CVX Code	Name
83	HepA ped/adol 2 dose
84	HepA pediatric/adolescent (3 dose)

31	HepA pediatric NOS
52	HepA adult
85	HepA NOS
104	HepA-HepB (Twinrix)

5.1.2.2 Hep B

CVX Code	Name
08	HepB peds <20yrs
42	HepB high risk infant
45	HepB NOS
43	HepB adult =>20yrs
44	HepB-dialysis
51	Hib/HepB (Comvax)
102	DTP-Hib-HepB
110	DTaP-HepB-IPV (Pediarix)
104	HepA-HepB (Twinrix)
132	DTaP-IPV-Hib-HepB, historical
146	DTaP, IPV, Hib, Hep B
189	Hep B, adjuvanted

5.1.2.3 MMR

CVX Code	Name
03	MMR
05	Measles
06	Rubella
07	Mumps
04	Measles/Rubella
38	Mumps/Rubella
94	MMR-Varicella

5.1.2.4 Varicella

CVX Code	Name
21	Varicella
94	MMR-Varicella

5.1.2.5 Rotavirus

CVX Code	Name
116	Rotavirus RV5 (RotaTeq, 3 dose)
119	Rotavirus RV1 (Rotarix, 2 dose)
122	Rotavirus NOS
74	Rotavirus

5.1.2.6 Hib

CVX Code	Name
46	Hib-PRP-D (ProHIBIT)
47	Hib-HbOC (HibTITER)
48	Hib-PRP-T (ActHIB, Hiberix)
49	Hib-PRP-OMP (PedvaxHIB)
17	Hib NOS
50	DTaP-Hib (TriHiBit)
51	Hep B-Hib (PRP-OMP (ComVAX)
120	DTaP-Hib (PRP-T)-IPV
22	DTP-Hib (Tetramune; OmniHib-DTP)
102	DTP-Hib-HepB
132	DTaP-IPV-Hib-HepB, historical
146	DTaP-IPV-Hib-HepB
148	Mening C&Y-Hib PRP-T (Menhibrix) (Only Hib component evaluated)

170	DTaP-IPV-Hib

5.1.2.7 HPV

CVX Code	Name
62	HPV Quadrivalent (Gardasil)
118	HPV Bivalent (Cervarix)
137	HPV NOS
165	HPV9

5.1.2.8 Pneumococcal

CVX Code	Name
100	Pneumococcal Conjugate 7 valent (PCV 7)
133	Pneumococcal Conjugate 13 (PCV 13)
109	Pneumococcal NOS
152	Pneumoccocal Conjugate NOS
33	Pneumococcal Polysaccharide 23 valent

5.1.2.9 Influenza

CVX Code	Name
15	influenza, split
16	influenza, whole
88	influenza, unspecified formulation
111	influenza, live, intranasal
135	influenza, high dose, seasonal
140	influenza, seasonal, injectable, preservative free

CVX Code	Name
141	influenza, seasonal, injectable
144	influenza, seasonal, intradermal, preservative free
149	influenza, live, intranasal, quadrivalent
150	influenza, injectable, quadrivalent, preservative free
151	influenza nasal, unspecified formulation
153	influenza, injectable, MDCK, preservative free
155	influenza, recombinant, injectable, preservative free
158	Influenza-IIV4, IM (>3yrs)
161	Influenza, injectable, quadrivalent, preservative free, pediatric
166	Influenza, intradermal, quadrivalent, preservative free, injectable
168	Seasonal trivalent influenza vaccine, adjuvanted, preservative free
171	Influenza, injectable, Madin Darby Canine Kidney, preservative free, quadrivalent
185	Influenza, recombinant, quadrivalent, injectable, preservative free
186	Influenza, injectable, MDCK, quadrivalent

5.1.2.10 H1N1

CVX Code	Name
125	Novel Influenza-H1N1-09, nasal
126	Novel influenza-H1N1-09, preservative-free
127	Novel influenza-H1N1-09
128	Novel Influenza-H1N1-09, all formulations

5.1.2.11 Meningococcal ACWY

CVX Code	Name
114	meningococcal MCV4P (Menactra)
136	meningococcal MCV4O (Menveo)
32	meningococcal MPSV4 (Menomune)
108	meningococcal, unspecified formulation
147	meningococcal MCV4, unspecified formulation
148	Mening C&Y-Hib PRP-T (Menhibrix) (Only Hib component evaluated)

5.1.2.12 Polio

CVX Code	Name
02	OPV
10	IPV
89	polio, unspecified formulation
110	DTaP/HepB/IPV
120	DTaP/IPV/Hib
130	DTaP/IPV
132	DTaP-IPV-Hib-HepB, historical
146	DTaP-IPV-Hib-HepB
170	DTaP-IPV-Hib
178	OPV bivalent
179	OPV ,monovalent, unspecified (NOS)
182	OPV, unspecified (NOS)

5.1.2.13 DTP

CVX Code	Name
01	DTP
09	Td (adult), absorbed
20	DTaP
22	DTP-Hib (Tetramune; OmniHib-DTP)
28	DT (pediatric)
50	DTaP-Hib (TriHiBit)
102	DTP-Hib-Hep B
106	DTaP, 5 pertussis antigens
107	DTaP, unspecified formulation
110	DTaP-Hep B-IPV (Pediarix)
113	Td (adult) preservative free
115	Tdap
120	DTaP-Hib-IPV (Pentacel)
130	DTaP-IPV
132	DTaP-IPV-Hib-HepB, historical
138	Td (adult, not adsorbed)
139	Td (adult) NOS
146	DTaP, IPV, Hib, Hep B
170	DTaP-IPV-Hib

5.1.2.14 Zoster

CVX Code	Name
121	Zoster vaccine, live
187	Zoster vaccine, recombinant
188	Zoster vaccine, unspecified formulation (NOS)

5.1.2.15 Meningococcal B

CVX Code	Name
162	Meningococcal B FHbp, recombinant (Trumenba)
163	Meningococcal B 4C, OMV (Bexsero)

5.2 HL7 Administrative Gender - Code System 2.16.840.1.113883.5.1

Code Value	Description
F	Female
M	Male

5.3 SNOMED - Code System 2.16.840.1.113883.6.5

Code Value	Description
384810002	Immunization/vaccination management (procedure)

5.4 Disease Immunity Value - Code System 2.16.840.1.113883.3.795.12.100.8

Code Value	Description
DISEASE_DOCUMENTED	Disease Documented
PROOF_OF_IMMUNITY	Proof of Immunity

5.5 Disease - Code System 2.16.840.1.113883.6.103

When sending up disease immunity as per below codes to ICE, use the new code system specified in the below table for ICD-9-CM, or one of the next two sections.

Code Value	Description
070.1	Hep A
070.30	Hep B
055.9	Measles
072.9	Mumps
056.9	Rubella
052.9	Varicella

5.6 Disease – Code System 2.16.840.1.113883.6.90

When sending up disease immunity as per below codes to ICE, use the new code system specified below for ICD-10-CM.

Code Value	Description
B15.9	Hepatitis A without hepatic coma
B19.10	Unspecified viral hepatitis B without hepatic coma
B05.9	Measles without complication
B26.9	Mumps without complication
B06.9	Rubella without complication
B01.9	Varicella without complication

5.7 Disease – Code System 2.16.840.1.113883.6.96

When sending up disease immunity as per below codes to ICE, use the new code system specified below for SNOMED-CT.

Code Value	Description
278971009	Serology confirmed hepatitis A
271511000	Serology confirmed hepatitis B
371111005	Serology confirmed Measles
371112003	Serology confirmed Mumps
278968001	Serology confirmed Rubella
371113008	Serology confirmed Varicella
38907003	History of Varicella infection

5.8 Disease Immunity Reason - Code System 2.16.840.1.113883.3.795.12.100.9

Code Value	Description
IS_IMMUNE	Is Immune

5.9 Evaluation Validity - Code System 2.16.840.1.113883.3.795.12.100.2

Code Value	Description
VALID	Valid Immunization
ACCEPTED	Accepted Immunization
INVALID	Invalid Immunization
IGNORE	Ignore Immunization
NOT_EVALUATED	Shot Not Evaluated

5.10 Evaluation Focus (Vaccine Group) - Code System 2.16.840.1.113883.3.795.12.100.1

Code Value	Description
100	Hep B Vaccine Group
810	Hep A Vaccine Group
200	DTP Vaccine Group
300	Hib Vaccine Group
400	Polio Vaccine Group
500	MMR Vaccine Group
600	Varicella Vaccine Group
620	Zoster Vaccine Group
750	Pneumococcal Vaccine Group
800	Influenza
820	Rotavirus Vaccine Group
830	Meningococcal Vaccine Group
835	Meningococcal B Vaccine Group
840	Human Papillomavirus Vaccine Group
890	H1N1 Influenza
999	"Other" Vaccine Group

5.11 Evaluation Reason - Code System 2.16.840.1.113883.3.795.12.100.3

Code Value	Description
ABOVE_MAX_AGE_VACCINE	Above Maximum Age for the Vaccine
ABOVE_REC_AGE_SERIES	Above Recommended Age for the

Code Value	Description
	Series
BELOW_MINIMUM_AGE_FINAL_DOSE	Below Minimum Age for the Final Dose
BELOW_MINIMUM_AGE_SERIES	Below Minimum Age for Series
BELOW_MINIMUM_AGE_VACCINE	Below Minimum Age for the Vaccine
BELOW_MINIMUM_INTERVAL	Below Minimum Interval
BELOW_MIN_INTERVAL_PCV_PPSV	Below Minimum Interval between PCV and PPSV
BELOW_REC_AGE_SERIES	Below Recommended Age for Series
BOOSTER_ONLY	Booster Only
D_AND_T_INVALID/P_VALID	Diphtheria and tetanus components invalid due to minimum interval violation, pertussis component valid
DISEASE_DOCUMENTED	Disease Documented
DUPLICATE_SAME_DAY	Duplicate Shot (Same Day)
EXTRA_DOSE	Extra Dose
INSUFFICIENT_ANTIGEN	Insufficient Antigen
INVALID_AGE	Invalid Age
MISSING_ANTIGEN	Missing Antigen
OUTSIDE_SEASON	Outside Season
OUTSIDE_FLU_VAC_SEASON	Outside Flu Season
PRIOR_TO_DOB	Prior to Date of Birth
PROOF_OF_IMMUNITY	Proof of Immunity
SELECT_ADJUVANT_PRODUCT_INTERVAL	Below Minimum Interval between Select Adjuvant Products
TOO_EARLY_LIVE_VIRUS	Too Early due to Live Virus
VACCINE_NOT_MEMBER_OF_SERIES	Vaccine Supplied is not a Member of the Series
WAITING_FOR_EVALUATION	Waiting for Evaluation
WRONG_GENDER	Wrong Gender
VACCINE_NOT_SUPPORTED	Vaccine Not Supported
VACCINE_NOT_LICENSED_FOR_MALES	Vaccine Not Licensed for Males
VACCINE_NOT_ALLOWED	Vaccine Not Allowed
VACCINE_NOT_ALLOWED_FOR_THIS_DOSE	Vaccine Not Allowed for this Dose
VACCINE_NOT_COUNTED_BASED_ON_ MOST_RECENT_VACCINE_GIVEN (note: remove extraneous space)	Vaccine not Counted Based on Prior Vaccine Administered
VACCINE_NOT_PART_OF_THIS_SERIES	Vaccine is Not a Part of this Series

5.12 Recommendation Value - Code System 2.16.840.1.113883.3.795.12.100.5

Code Value	Description
RECOMMENDED	Recommended

Code Value	Description
CONDITIONAL	Conditionally Recommended
FUTURE_RECOMMENDED	Recommended in the Future
NOT_RECOMMENDED	Not Recommended
RECOMMENDATION_NOT_AVAILABLE	Recommendation Not Available (*e.g.* - ICE did not forecast for unsupported vaccine)

5.13 Recommendation Focus (Vaccine Group) - Code System 2.16.840.1.113883.3.795.12.100.1

Code Value	Description
100	Hep B Vaccine Group
810	Hep A Vaccine Group
200	DTP Vaccine Group
300	Hib Vaccine Group
400	Polio Vaccine Group
500	MMR Vaccine Group
600	Varicella Vaccine Group
620	Zoster Vaccine Group
750	Pneumococcal Vaccine Group
800	Influenza
820	Rotavirus Vaccine Group
830	Meningococcal Vaccine Group
835	Meningococcal B Vaccine Group
840	Human Papillomavirus Vaccine Group
890	H1N1 Influenza
999	"Other" Vaccine Group

5.14 Recommendation Reason - Code System 2.16.840.1.113883.3.795.12.100.6

Code Value	Description
ABOVE_AGE_MAY_COMPLETE	Above Recommended Age but may Complete Series
BELOW_MINIMUM_AGE_HIGH_RISK_SERIES	Below Minimum Age for High Risk Series
CLINICAL_PATIENT_DISCRETION	At Clinician's Discretion
COMPLETE	Series Complete
COMPLETE_HIGH_RISK	Series Complete Unless High Risk
DISEASE_DOCUMENTED	Disease Documented
DUE_IN_FUTURE	Due in the Future
DUE_NOW	Due Now
HIGH_RISK	High Risk

Code Value	Description
IGNORE	Ignore
NOT_SPECIFIED	Not Specified
OTHER_VACCINE_PRODUCT_POSSIBLE	Other Vaccine Product Possible
OUTSIDE_FLU_VAC_SEASON	Outside of Influenza Vaccine Season
PROOF_OF_IMMUNITY	Proof of Immunity
TOO_OLD	Too Old
TOO_OLD_HIGH_RISK	Too Old (High Risk)
TOO_OLD_TO_INITIATE	Too Old to Initiate Series
VAC_GROUP_NO_LONGER_REC	Vaccine Group No Longer Recommended
WRONG_GENDER	Wrong Gender
NOT_SUPPORTED	Not Supported