

EHR Vendor Implementation of Ebola Virus Disease (EVD) – Algorithm for Evaluation of the Returned Traveler

Data Capture & Exchange using Standards

CDC Vocabulary & Messaging Team

10/23/2014

Brief overview of data elements (questions) and value sets (answer list) associated with “EVD Algorithm – Evaluation of the Returned Traveler”. Emergency Department system/ EHR vendors could use the sample form design, standard vocabulary codes and sample HL7 2.5.1 message to implement this quickly in their system. Latest version of this document can be downloaded from CDC vocabulary server (PHIN VADS).

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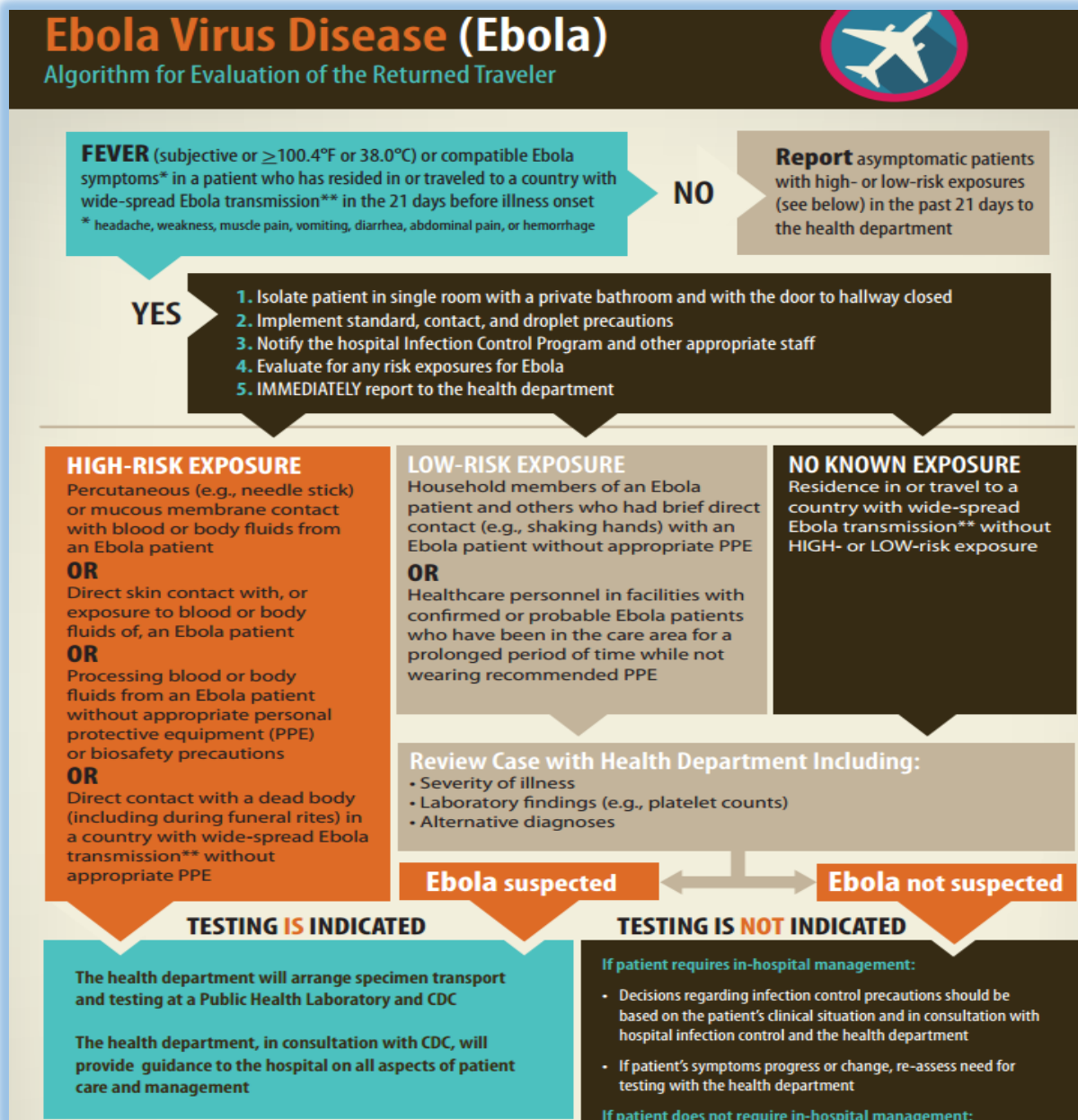
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Ebola Virus Disease

- Algorithm for Evaluation of Returned Traveler

Based upon the Algorithm for evaluation of returned traveler, the following standardized data elements (questions) and value sets (answer list) could be used by Emergency Department system vendors to capture the data needed for evaluation.

Algorithm version date: 10/22/2014. Please see the CDC website link for the latest version of "[Algorithm for Evaluation of Returned Traveler](#)"



Sample Form

The sample form below illustrates the data elements from "Ebola Virus Disease – Algorithm for Evaluation of returned traveler". Multiple responses are inferred in the form as "Checkboxes"

1. Did the patient travel to any of the following countries with wide-spread transmission of Ebola Virus Disease during the incubation period (2 to 21 days prior to symptom onset)?

Guinea
 Liberia
 Sierra Leone

Other (please specify)

2. Did the patient experience any of the following exposures during the incubation period (2 to 21 days prior to symptom onset)?

Percutaneous (e.g., needle stick) or mucous membrane contact with blood or body fluids from an Ebola patient
 Direct skin contact with, or exposure to blood or body fluids of, an Ebola patient
 Processing blood or body fluids from an Ebola patient without appropriate personal protective equipment (PPE) or biosafety precautions
 Direct contact with a dead body (including during funeral rites) in a country with wide-spread Ebola transmission without appropriate PPE
 Household members of an Ebola patient and others who had brief direct contact (e.g., shaking hands) with an Ebola patient without appropriate PPE
 Healthcare personnel in facilities with confirmed or probable Ebola patients who have been in the care area for a prolonged period of time while not wearing recommended PPE
 Residence in or travel to a country with wide-spread Ebola transmission without HIGH- or LOW-risk exposure

Other (please specify)

3. Date of Exposure to Ebola Virus Disease

MM DD YYYY
Date / /

4. Symptoms

Fever
 Headache
 Weakness
 Muscle Pain
 Other (please specify)

Vomiting
 Abdominal Pain
 Hemorrhage

5. Temperature

Temperature
(Enter the number)

Unit
(Celsius or Fahrenheit)

The remaining sections describe the data elements in more detail, including the terminologies.

Data elements and vocabulary associated with EVD – Patient Evaluation Algorithm

1. Travel History – Country of Exposure

FEVER (subjective or $\geq 100.4^{\circ}\text{F}$ or 38.0°C) or compatible Ebola symptoms* in a patient who has resided in or traveled to a country with wide-spread Ebola transmission** in the 21 days before illness onset
 * headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage

1. Did the patient travel to any of the following countries with wide-spread transmission of Ebola Virus Disease during the incubation period (2 to 21 days prior to symptom onset)?

Guinea

Liberia

Sierra Leone

Other (please specify)

Data Element or Question LOINC Code for “Country of Exposure”: 66413-6

LOINC Name: Country exposure sequence PhenX

Note: Following up with LOINC SDO to remove Phenx from name as this is a trial code and may change.

CDC vocabulary server ([PHIN VADS](#)) [link for latest version of data element or question identifiers](#) associated with “Algorithm for EVD – Evaluation of the Returned Traveler”

Codes for Value set (Answer List):

Value Set Version Date: 10/22/2014.

Please use the following CDC vocabulary server (PHIN VADS) link to get the latest version of the [widespread transmission countries](#).

Value Set Name	Value Set Code	Value Set OID
Countries Widespread Transmission (EVD)	PHVS_CountriesWidespreadTransmission_EVD	2.16.840.1.114222.4.11.7248

Value set concepts:

Concept Code	Concept Name	Code System OID	HL7 Table 0396 Code	Code System Name
GIN	GUINEA	1.0.3166.1	ISO3166_1	Country (ISO 3166-1)
LBR	LIBERIA	1.0.3166.1	ISO3166_1	Country (ISO 3166-1)
SLE	SIERRA LEONE	1.0.3166.1	ISO3166_1	Country (ISO 3166-1)

2. Exposure Risk

HIGH-RISK EXPOSURE

Percutaneous (e.g., needle stick) or mucous membrane contact with blood or body fluids from an Ebola patient

OR

Direct skin contact with, or exposure to blood or body fluids of, an Ebola patient

OR

Processing blood or body fluids from an Ebola patient without appropriate personal protective equipment (PPE) or biosafety precautions

OR

Direct contact with a dead body (including during funeral rites) in a country with wide-spread Ebola transmission** without appropriate PPE

LOW-RISK EXPOSURE

Household members of an Ebola patient and others who had brief direct contact (e.g., shaking hands) with an Ebola patient without appropriate PPE

OR

Healthcare personnel in facilities with confirmed or probable Ebola patients who have been in the care area for a prolonged period of time while not wearing recommended PPE

NO KNOWN EXPOSURE

Residence in or travel to a country with wide-spread Ebola transmission** without HIGH- or LOW-risk exposure

2. Did the patient experience any of the following exposures during the incubation period (2 to 21 days prior to symptom onset)?

- Percutaneous (e.g., needle stick) or mucous membrane contact with blood or body fluids from an Ebola patient
- Direct skin contact with, or exposure to blood or body fluids of, an Ebola patient
- Processing blood or body fluids from an Ebola patient without appropriate personal protective equipment (PPE) or biosafety precautions
- Direct contact with a dead body (including during funeral rites) in a country with wide-spread Ebola transmission without appropriate PPE
- Household members of an Ebola patient and others who had brief direct contact (e.g., shaking hands) with an Ebola patient without appropriate PPE
- Healthcare personnel in facilities with confirmed or probable Ebola patients who have been in the care area for a prolonged period of time while not wearing recommended PPE
- Residence in or travel to a country with wide-spread Ebola transmission without HIGH- or LOW-risk exposure

Other (please specify)

- **Data Element or Question SNOMED Code for “Exposure to Biological Agent (Event)”:**
418307001

SNOMED Name: Exposure to biological agent (event)

CDC vocabulary server ([PHIN VADS](#)) [link for latest version of data element or question identifiers](#) associated with “Algorithm for EVD – Evaluation of the Returned Traveler”

- **Codes for Value set (Answer List):**

Please use the following CDC vocabulary server (PHIN VADS) link to get the latest version of the [Exposure Risk \(EVD\) value set](#).

Value Set Name	Value Set Code	Value Set OID	Last Updated Date
Exposure Risk (EVD)	PHVS_ExposureRisk_EVD	2.16.840.1.114222.4.11.7249	10/22/2014

Value set concepts:

Concept Code	Concept Name	Code System OID	HL7 Table 0396 Code	Code System Name
EVD1	Percutaneous (e.g. needle stick) or mucous membrane contact with blood or body fluids from an Ebola patient	2.16.840.1.1 14222.4.5.2 74	CDCPHINVS	PHIN VS (CDC Local Coding System)
EVD2	Direct skin contact with or exposure to blood or body fluids of an Ebola patient	2.16.840.1.1 14222.4.5.2 74	CDCPHINVS	PHIN VS (CDC Local Coding System)
EVD3	Processing blood or body fluids from an Ebola patient without appropriate PPE or biosafety precautions	2.16.840.1.1 14222.4.5.2 74	CDCPHINVS	PHIN VS (CDC Local Coding System)
EVD4	Direct contact with a dead body (including during funeral rites) in a country with widespread Ebola transmission without appropriate PPE	2.16.840.1.1 14222.4.5.2 74	CDCPHINVS	PHIN VS (CDC Local Coding System)
EVD5	Household members of an Ebola patient and others who had brief direct contact (e.g. shaking hands) with an Ebola patient without appropriate PPE	2.16.840.1.1 14222.4.5.2 74	CDCPHINVS	PHIN VS (CDC Local Coding System)
EVD6	Healthcare personnel in facilities with confirmed or probable Ebola patients who have been in the care area for a prolonged period of time while not wearing appropriate PPE	2.16.840.1.1 14222.4.5.2 74	CDCPHINVS	PHIN VS (CDC Local Coding System)
EVD7	Residence in or travel to a country with widespread Ebola transmission without HIGH- or LOW-risk exposure	2.16.840.1.1 14222.4.5.2 74	CDCPHINVS	PHIN VS (CDC Local Coding System)
OTH	Other	2.16.840.1.1 13883.5.100 8	NULLFL	NullFlavor

3. Incubation Period: 21 days (Date of Exposure)

In order to calculate the exposure in the past 21 days, "Date of Exposure" needs to be obtained during an evaluation.

Report asymptomatic patients with high- or low-risk exposures (see below) in the past 21 days to the health department

3. Date of Exposure to Ebola Virus Disease

Date MM DD YYYY
 / /

Data Element or Question LOINC Code for "Date of Exposure": 67723-7

LOINC Name: "Date of Health related event"

CDC vocabulary server ([PHIN VADS](#)) [link for latest version of data element or question identifiers](#) associated with "Algorithm for EVD – Evaluation of the Returned Traveler"

4. Symptoms

FEVER (subjective or $\geq 100.4^{\circ}\text{F}$ or 38.0°C) or compatible Ebola symptoms* in a patient who has resided in or traveled to a country with wide-spread Ebola transmission** in the 21 days before illness onset
 * headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage

4. Symptoms

<input type="checkbox"/> Fever <input type="checkbox"/> Headache <input type="checkbox"/> Weakness <input type="checkbox"/> Muscle Pain <input type="checkbox"/> Other (please specify)	<input type="checkbox"/> Vomiting <input type="checkbox"/> Abdominal Pain <input type="checkbox"/> Hemorrhage
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Data Element or Question LOINC Code for "Symptoms": 56831-1

LOINC Name: Problem associated signs symptoms

CDC vocabulary server ([PHIN VADS](#)) [link for latest version of data element or question identifiers](#) associated with "Algorithm for EVD – Evaluation of the Returned Traveler"

Codes for Value set (Answer List):

Please use the following CDC vocabulary server (PHIN VADS) link to get the latest version of "[Symptoms](#)".

Value Set Name	Value Set Code	Value Set OID	Last Updated Date
Symptoms (EVD Triage)	PHVS_Symptoms_EVD_Triage	2.16.840.1.114222.4.11.7247	10/21/2014

Value set concepts:

Concept Code	Concept Name	Preferred Concept Name	Code System OID	HL7 Table 0396 Code	Code System Name
21522001	Abdominal pain (finding)	Abdominal pain	2.16.840.1.113883.6.96	SCT	SNOMED-CT
13791008	Asthenia (finding)	Weakness	2.16.840.1.113883.6.96	SCT	SNOMED-CT
386661006	Fever (finding)	Fever	2.16.840.1.113883.6.96	SCT	SNOMED-CT
25064002	Headache (finding)	Headache	2.16.840.1.113883.6.96	SCT	SNOMED-CT
50960005	Hemorrhage (morphologic abnormality)	Hemorrhage	2.16.840.1.113883.6.96	SCT	SNOMED-CT
68962001	Muscle pain (finding)	Muscle pain	2.16.840.1.113883.6.96	SCT	SNOMED-CT
OTH	other	other	2.16.840.1.113883.5.1008	NULLFL	NullFlavor
422400008	Vomiting (disorder)	Vomiting	2.16.840.1.113883.6.96	SCT	SNOMED-CT

5. Body Temperature Measurement

FEVER (subjective or $\geq 100.4^{\circ}\text{F}$ or 38.0°C) or compatible Ebola symptoms* in a patient who has resided in or traveled to a country with wide-spread Ebola transmission** in the 21 days before illness onset
 * headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage

5. Temperature

Temperature
 (Enter the number)

Unit
 (Celsius or Fahrenheit)

Data Element or Question LOINC Code for "Body Temperature": 8310-5

LOINC Name: Body Temperature

Codes for Value set- Temperature Units

Concept Code	Concept Name	Preferred Concept Name	Code System OID	HL7 Table 0396 Code	Code System Name
Cel	degree Celsius	degree Celsius [temperature]	2.16.840.1.113883.6.8	UCUM	UCUM - Unified Code for Units of Measure
[degF]	degree Fahrenheit	degree Fahrenheit [temperature]	2.16.840.1.113883.6.8	UCUM	UCUM - Unified Code for Units of Measure

- **List of question or observation identifiers:**

CDC vocabulary server ([PHIN VADS](#)) [link for latest version of data element or question identifiers](#) associated with "Algorithm for EVD – Evaluation of the Returned Traveler"

Value Set Name	Value Set Code	Value Set OID	VS Last Updated Date
Observation Identifiers (EVD Triage)	PHVS_ObservationIdentifiers_EVD_Triage	2.16.840.1.114222.4.11.7250	10/21/2014

Value Set Concepts:

Concept Code	Concept Name	Preferred Concept Name	Code System OID	HL7 Table 0396 Code	Code System Name
8310-5	Body temperature	Body temperature	2.16.840.1.113883.6.1	LN	LOINC
66413-6	Country of exposure	Country of exposure	2.16.840.1.113883.6.1	LN	LOINC
67723-7	Date of health event	Date of health-related event	2.16.840.1.113883.6.1	LN	LOINC
418307001	Exposure to biological agent (event)	Exposure to biological agent	2.16.840.1.113883.6.96	SCT	SNOMED-CT
56831-1	Problem associated signs+symptoms	Symptoms and Signs	2.16.840.1.113883.6.1	LN	LOINC

Appendix A: CDC Vocabulary Server PHIN VADS

- Public Health Information Network Vocabulary Access and Distribution Server (PHIN VADS) is CDC's Vocabulary server that hosts vocabulary (value sets) associated with public health forms and HL7 messaging guides.
- PHIN VADS can be accessed via browser at <http://phinvads.cdc.gov> . All the Ebola Virus Disease reporting related vocabulary including ER Triage patient evaluation and Electronic Lab Reporting can be downloaded from PHIN VADS vocabulary view [link](#).
- [Home page](#) of PHIN VADS also has link to Ebola reporting vocabulary.
- Keyword: "Ebola" can be typed in the search box to get EVD vocabulary view.

The screenshot shows the PHIN VADS website interface. At the top, there is a navigation bar with 'PHIN Vocabulary Access and Distribution System (VADS)', 'Help | Contact Us', and the CDC logo. Below this is a search bar with 'Search Home', 'RCMT', and 'Quick Search' options. The main content area includes a search box with a magnifying glass icon and a 'Search All Vocabulary' button. A sidebar on the left contains navigation links such as 'Application Version: 3.3.9', 'Content Version: 2011.06.17', 'Release Notes', 'Related Link(s)', and 'Developer Link(s)'. The main content area features a 'PHIN VADS Hot Topics' section with three items: 'Ebola Virus Reporting Vocabulary', 'RCMT - Reportable Condition Mapping Table', and 'Meaningful Use Healthcare Provider Reporting to Central Cancer Registries'. Each item includes a brief description and a 'LINK' to the relevant resource.

- PHIN VADS can also be accessed by developers using Application Program Interface (API) using web services using HL7 Common Terminology Services (CTS). For more information about VADS web services, please see the [developers guide](#).

Appendix B: Illustration of vocabulary codes associated with “Ebola Virus Disease – Evaluation of Returned Traveler” in HL7 2.5.1 message.

These observations can be included in any of the following HL7 message types:

- ADT^A01 (Admission)
- ADT^A04 (Registration)
- ADT^A08 (Update)
- ORU^R01 (Unsolicited Observation)

Scenario 1: Patient travelled from Liberia and had a positive history of exposure in the past 21 days prior to symptom onset. The patient complained of fever and hemorrhage. ER nurse documented the measured temperature as “103.3 Fahrenheit”.

HL7 Message Example Style 1: In this message, both the symptoms are included in the same OBX segment separated by “~” in OBX-5.

```
OBR|1|""|Ebola-Pat2-  
caseId^SendAppName^2.16.840.1.114222.3.567^ISO|EVD ER  
Triage Patient  
Evaluation^CDCPHINVS|||201410076170000|||||||20141008617000  
0|||F|||||37109004^Ebola Virus Disease^SCT  
OBX|1|CWE|66413-6^Country of  
Exposure^LN||LBR^Liberia^ISO3166_1|||||F  
OBX|2|CWE|418307001^Exposure Risk^SCT||EVD2^Direct skin contact  
with or exposure to blood or body fluids of an Ebola  
patient^CDCPHINVS|||||F  
OBX|3|TS|67723-7^Date of Exposure^LN||20141006|||||F  
OBX|4|CWE|56831-  
1^Symptoms^LN||386661006^Fever^SCT~50960005^Hemorrhage^SCT|  
||||F
```

OBX|5|SN|8310-5^Body
Temperature^LN||^103.3|[degF]^Fahrenheit^UCUM|||||F

HL7 Message Example Style 2: In this message, each of the symptoms has its own OBX segment linked together by OBX-4 sub-id's 1 & 2.

OBR|1|""|Ebola-Pat2-
caseId^SendAppName^2.16.840.1.114222.3.567^ISO|EVDER^EVD ER
Triage Patient
Evaluation^CDCPHINVS|||201410076170000|||||||||||20141008617000
0|||F|||||37109004^Ebola Virus Disease^SCT

OBX|1|CWE|66413-6^Country of
Exposure^LN||LBR^Liberia^ISO3166_1|||||F

OBX|2|CWE|418307001^Exposure Risk^SCT||EVD2^Direct skin contact
with or exposure to blood or body fluids of an Ebola
patient^CDCPHINVS|||||F

OBX|3|TS|67723-7^Date of Exposure^LN||20141006|||||F

OBX|4|CWE|56831-1^Symptoms^LN|1|386661006^Fever^SCT|||||F

OBX|5|CWE|56831-
1^Symptoms^LN|2|50960005^Hemorrhage^SCT|||||F

OBX|6|SN|8310-5^Body
Temperature^LN||^103.3|[degF]^Fahrenheit^UCUM|||||F