ESP CASE DETECTION ALGORITHM

Human Immunodeficiency Virus (HIV)

Document Version 3.6

Prepared by the Department of Population Medicine at Harvard Medical School and Harvard Pilgrim Health Care Institute on behalf of the Massachusetts Department of Public Health.

esphealth@harvardpilgrim.org

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Modification History

Version	Date	Modification	By
3.6	10/17/2023	• Modify LOINC codes per DPH	CII
3.5	07/17/2023	• Added/updated medications	CII
3.4	08/22/2022	• Updates to LOINCs per changes from DPH. Added 25842-6, 30245-5, and 69354-9	CII
3.3	10/7/2021	• Replaced hiv_geenius with new abstract lab name hiv_ab_diff • Clarified wording for 3 meds criteria • Added abstract lab names to lab mapping table • Updated lab mapping table to separate out historical labs • Updates to entire lab mapping table for descriptions, positive results, etc. • Corrected Lab Table Label (from 4 to 5)	CII/DPM
3.2	1/10/2020	Added new HIV medications	CII/DPM
3.1	1/8/2020	Added new HIV medications	DPM
3.0	3/1/2019	Added new provider reporting fields	DPM
2.5.1	1/24/2018	Added new HIV medication	DPM
2.5	9/14/2018	Added additional OI diagnosis codes	MDPH/DPM
2.4	12/8/2017	• Removed site-specific language • Indicated which variables are not yet being reported via ESP. • Added reporting time frames for lab results and medications.	DPM
2.32	10/11/2017	Added ESP Logo and MDPH branding, formatting	DPM
2.31	10/4/2017	Transferred to updated algorithm template	DPM
2.3	7/14/2017	Added Multispot and Geenius tests to case criteria	MDPH/DPM
2.2	3/15/2017	• Added modified criteria to revoke a case. • Minor modifications to reportable diagnosis codes.	DPM
2.1	10/20/2016	Removed criteria to revoke a case.	DPM
2.0	9/22/2016	• Added conditions to the case criteria. • Increased RNA Viral Load threshold. Increased timeframe in which 3 different antivirals can occur.	DPM
1.0	5/10/2016	Original circulated version.	DPM

Section 1. *Overview*

The purpose of this document is to describe the criteria used to identify and report Human Immunodeficiency Virus (HIV) cases and their continuum of care from electronic medical records (EMR) using ESP and report them to the Massachusetts Department of Public Health (MDPH). In addition, ESP will provide follow-up reports for subsequent events relevant to the continuum of care (e.g., serial CD4 and viral load testing, HIV treatment, etc.).

Section 2. *Criteria used to identify cases using ESP data*

I. CASE TYPES

This algorithm was developed to identify both new and prevalent HIV cases. Once identified, additional information will be captured on each case on an ongoing basis to evaluate the continuum of care.

II. TIME WINDOW

Once HIV is acquired, cases are considered to be active lifelong. Thus, there is no recurrence window for this disease.

III. CASE CRITERIA

Classify patient as HIV positive if any of the following conditions are true:

A. Positive Western Blot, Multispot, or Antibody Differentiation test result
    a. Western Blot & Multispot are deprecated labs. Used only for historical case detection on historical labs.
B. Positive HIV Antigen/Antibody test AND positive HIV ELISA (any time window)
C. HIV RNA Viral Load > 200 copies/mL.
D. HIV Qualitative PCR
E. ≥2 ICD codes for HIV and history of prescription for ≥3 HIV meds ever
F. HIV on problem list and history of prescription for ≥3 HIV meds ever
G. Concurrent prescriptions for 3 or more *different* antiretrovirals for at least 1 month
    1. If patient prescribed combo pill then count as 2 or 3 meds as appropriate
    2. Rationale for prescription criteria:
        a. Need med-based detection to capture patients on treatment with negative viral loads (since they'd be classified as negative using lab criteria alone)
        b. 3 meds prescribed over two intervals at least 30 days apart to exclude patients on treatment for hepatitis B and patients receiving pre- or post-exposure prophylaxis
    3. Two approaches to meeting this criteria are valid: (a) based on the frequency and number of pills dispensed or (b) two start dates for each of 3 or more antiretrovirals at least 30 days apart but no more than 400 days apart.
        a. The start dates for any set of 3 drugs need not be the same. For example, if 2 drugs are started Jan 1, and the 3rd drug is started Jan 10, this would count as meeting the 3 or more meds criteria as of Jan 10.
        b. The sets of prescriptions for 3 or more antiretrovirals need not be for the same combination of drugs.

See Section 4 for codes used to define each component.

I. CRITERIA TO REVOKE A CASE

For patients meeting criteria (e), (f), or (g) above, a case should be revoked (i.e., classified as HIV negative) if he/she subsequently has a negative ELISA or negative Ag/Ab. If there are ≥2 ELISA or Ag/Ab results on the same day, then only revoke if all tests are negative. Note, however, that these patients are eligible to become cases again if they subsequently meet one of the above criteria.

Section 3. *Specifications for reporting diseases/conditions to the Massachusetts Department of Public Health*

I. INITIAL CASE REPORTING CRITERIA

All cases will be reported to MDPH upon initial detection.

II. CASE REPORT UPDATE CRITERIA

A repeat report will be sent to MDPH whenever any of the following occur:

1. New CD4 test result
2. New viral load test result
3. Prescription for HIV med (new meds, not a renewal)
4. Encounter with diagnosis code for HIV
5. Encounter with a diagnosis code for an opportunistic infection

III. DATA TO INCLUDE IN INITIAL REPORTS TO MDPH

A. Demographic

Name	Last, first, middle
Date of birth	yyyy/mm/dd
Social security number	Last 4 digits
Gender	Male / Female
Race	American Indian / Asian / Black / White / Other / Unknown
Ethnicity	Hispanic / Non-Hispanic / Unknown
Address	Line 1, line 2, city, state, zip, country
Phone	xxx-xxx-xxxx
Language spoken	
Medical record number	
PCP	Name, office address, phone number, email
Country of birth	
Housing status	
Insurance status	

B. Lab Ordering Facility Information

Facility name	
Facility address	Line 1, line 2, city, state, zip
Facility contact person	
Contact person email	
Contact person phone	xxx-xxx-xxxx
Facility phone	xxx-xxx-xxxx
Facility NPI	

C. Encounter Data

See Table 5 below for the NA codes to send provider fields in HL7 messages

Lab test ordering provider	Name and NPI
Prescribing provider	Name and NPI
Primary care provider	Name and NPI
Managing treatment provider	Name and NPI
Treatment encounter facility name	
Treatment encounter facility address	Line 1, line 2, city, state, zip
Treatment encounter facility NPI	
HIV visit date	Date of most recent encounter with an HIV code and all encounters following case identification

D. Laboratory Results

Report results within 30 days prior to the day on which case established and any time after the case date. ***Include test dates.***

HIV Antigen/Antibody Screen	
HIV ELISA Test (Antibody Screen)	
Western Blot	
Multispot	
Geenius	
HIV Quantitative RNA Viral Load	Most recent result
HIV Qualitative PCR	
CD4 Count	Most recent result

E. Pregnancy

Pregnancy flag active	Yes or No
Expected Date of Delivery (EDD)	

F. Medications

Report all medications from the specified ARV and OI medications lists given with 30 days prior to the case date and any time after the case date.

Treatment given	Yes or No
Current prescription for HIV medication	Text string including medication name, dose, frequency, and duration (calculated using start and end date). See Table 3 for specific medications.

Currently prescribed prophylactic medications	Text string including medication name, dose, frequency, and duration (calculated using start and end date). See Table 4 for specific medications. ***Note:*** *OI medications will not be reported upon initial implementation. Modifications will need to be made in ESP to send these medications separately from the above*.
Treatment date	Date on which each prescription was ordered.

G. Opportunistic Infections

If a diagnosis code for an opportunistic infection (see Table 2, below) are present within 30 days prior to case establishment, then report the following:

Infection name	See Table 2
Date of last encounter with diagnosis code for opportunistic infection	

H. Variables requiring further exploration

Several variables of interest for HIV still need to be explored with clinical providers. The following items are still under discussion, but will not hold up initial implementation.

Variable	Question in MAVEN	Status
Income level	"Income level as a percentage of poverty"	In the ESP model, but current reporting providers do not have this in their ESP data. Need to work with providers to understand if/how this information is captured.
Insurance type	"Type of health insurance?"	
Housing status	"Official Residence Type"	
Country of origin	"Country of birth"	
Sex risk	"HIV related risk"	Needs to be added to the ESP model and added by all providers.
Transgender status	"Gender"	Current reporting providers need to add "Transgender" as an option for gender in the ESP model.
Others	• "Did the case attend their last scheduled HIV appointment?" • "Was resistance testing performed prior to initiating ARV?" • "Was the patient provided with risk reduction counseling?" • "Was patient referred to health department for partner services?" • "Date of HIV Care Coordination Event" (separate from "HIV clinical visit date")	Need to work with providers to understand if/how this information is captured. These variables would need to be added to the ESP model.

Section 4. *Codes, laboratory tests, and medications used to identify criteria listed in Sections 1 and 2.*

I. DIAGNOSES CODES

Table 1. Diagnosis Codes Used to Identify HIV

Code Type	Code	Description
ICD-9-CM	042	HIV disease
ICD-9-CM	V08	Asymptomatic HIV infection status
ICD-10-CM	B20-B24	Human immunodeficiency virus (HIV) disease
ICD-10-CM	Z21	Asymptomatic HIV infection status
ICD-10-CM	B97.35	Human immunodeficiency virus, type 2 [HIV 2] as the cause of diseases classified elsewhere
ICD-10-CM	O98.7	HIV complicating pregnancy or childbirth

Table 2. Diagnosis Codes Used to define Opportunistic Infection

Code Type	Code	Description
ICD-9-CM	136.3	PCP pneumonia
ICD-10-CM	B59	PCP pneumonia
ICD-9-CM	130.*	Toxoplasmosis
ICD-10-CM	B58, B58.2, B58.9	Toxoplasmosis
ICD-9-CM	117.5, 321.0	Cryptococcus and Cryptococcal meningitis
ICD-10-CM	B45, B45.0, B45.1, B45.2, B45.3, B45.7, B45.8, B45.9	Cryptococcus and Cryptococcal meningitis
ICD-9-CM	007.4	Cryptosporidiosis
ICD-10-CM	A07.2	Cryptosporidiosis
ICD-9-CM	010-018	Tuberculosis
ICD-10-CM	A15-A19.9	Tuberculosis
ICD-9-CM	112.0	Candidiasis of mouth
ICD-9-CM	112.4	Candidiasis of lung
ICD-9-CM	112.5	Disseminated candidiasis
ICD-9-CM	112.84	Candidal esophagitis
ICD-10-CM	B37.0	Candidal stomatitis
ICD-10-CM	B37.1	Pulmonary candidiasis
ICD-10-CM	B37.81	Candidal esophagitis
ICD-10-CM	B37.83	Candidal cheilitis
ICD-9-CM	031.2	Disseminated MAC
ICD-10-CM	A31.2	Disseminated MAC
ICD-10-CM	A31, A31.0, A31.1, A31.8, A31.9	Mycobacterium infection
ICD-9-CM	046.3	Progressive multifocal leukencephalopathy (JC Virus)
ICD-10-CM	A81.2	Progressive multifocal leukencephalopathy (JC Virus)
ICD-10-CM	D06, D06.0, D06.1, D06.7, D06.9	Invasive cervical carcinoma

ICD-10-CM	B38, B38.0, B38.1, B38.2, B38.3, B38.4, B38.7, B38.8, B38.81, B38.89, B38.9	Coccidioidomycosis
ICD-10-CM	B25.0, B25.2, B25.8, B25.9	Cytomegalovirus disease
ICD-10-CM	G93.40, G93.49	Encephalopathy
ICD-10-CM	B00, B00.0, B00.1, B00.2, B00.3, B00.4, B00.5, B00.50, B00.51, B00.52, B00.53, B00.59, B00.7, B00.8, B00.81, B00.82, B00.89, B00.9	Herpesviral infection
ICD-10-CM	B39, B39.0, B39.1, B39.2, B39.3, B39.4, B39.5, B39.9	Histoplasmosis
ICD-10-CM	A07.3	Isosporiasis
ICD-10-CM	C46, C46.0, C46.1, C46.2, C46.3, C46.4, C46.5, C46.50, C46.51, C46.52, C46.7, C46.9	Kaposi sarcoma
ICD-10-CM	J84.2	Lymphoid interstitial pneumonia
ICD-10-CM	C83.70, C83.71, C83.72, C83.73, C83.74, C83.75, C83.76, C83.77, C83.78, C83.79	Burkitt lymphoma
ICD-10-CM	C83.30, C83.39, C83.80, C83.89	Diffuse large B-cell lymphoma
ICD-10-CM	J09.X1, J10.0, J11.0, J12, J12.0, J12.1, J12.2, J12.3, J12.8, J12.81, J12.89, J12.9, J13, J16, J16.0, J16.8, J17, J18, J18.0, J18.1, J18.2, J18.8, J18.9	Recurrent pneumonia
ICD-10-CM	A02.1	Salmonella sepsis
ICD-10-CM	A81.2	Progressive multifocal leukoencephalopathy
ICD-10-CM	R64, M62.5, M62.50, M62.58, M62.59	Wasting syndrome

II. MEDICATIONS

Table 3. HIV Medications

Drug Class	Generic Name	Brand Name
NRTI	Zidovudine	Retrovir
	Didanosine	Videx
	Stavudine	Zerit
	Lamivudine	Epivir
	Emtricitabine	Emtriva
	Tenofovir	Viread
	Abacavir	Ziagen
	Tenofovir + Emtricitabine	Truvada (PrEP)
	Tenofovir alafenamide + Emtricitabine	Descovy (PrEP)

	Zidovudine + Lamivudine	Combivir
	Abacavir + Lamivudine	Epzicom
	Abacavir + Lamivudine + Zidovudine	Trizivir
NNRTIs	Efavirenz	Sustiva
	Nivarapine	Viramune
	Rilpivirine	Edurant
	Etravirine	Intelence
	Delavirdine	Rescriptor
	Doravirine	Pifeltro
Integrase Inhibitors	Raltegravir	Isentress
	Dolutegravir	Tivicay
	Elvitegravir	Vitekta
	Cabotegravir	Vocabria
	Cabotegravir ER 600	Apretude (PrEP)
Fusion Inhibitors	Enfuvirtide	Fuzeon
	Maraviroc	Selzentry
Protease Inhibitors	Tipranavir	Aptivus
	Ritonavir	Norvir
	Indinavir	Crixivan
	Darunavir	Prezista
	Saquinavir	Invirase
	Atazanavir	Reyataz
	Nelfinavir	Viracept
	Fosamprenavir	Lexiva
	Lopinavir + Ritonavir	Kaletra
Single Tablet Combos	Efavirenz + Tenofovir + Emtricitabine	Atripla
	Rilpivirine + Tenofovir + Emtricitabine	Complera
	Dolutegravir + Abacavir + Lamivudine	Triumeq
	Elvitegravir + Cobicistat + Tenofovir + Emtricitabine	Stribild
	Dolutegravir + Cobicistat	Prezcobix
	Bictegravir + Emtricitabine + Tenofovir alafenamide	Biktarvy
	Elvitegravir + Cobicistat + Emtricitabine + Tenofovir alafenamide	Genvoya
	Emtricitabine + Rilpivirine + Tenofovir alafenamide	Odefsey
	Darunavir + Cobicistat + Emtricitabine + Tenofovir	Symtuza
	Efavirenz + Lamivudine + Tenofovir	Symfi / Symfi Lo
	Dolutegravir + Lamivudine	Dovato
	Atazanavir + Cobicistat	Evotaz
	Dolutegravir + Rilpivirine	Juluca
	Doravirine + Lamivudine + Tenofovir	Delstrigo
	Lamivudine + Tenofovir	Cimduo, Temixys
	Cabotegravir + rilpivirine	Cabenuva
Capsid inhibitors	Lenacapavir	Sunlenca

Table 4. Medications for Primary Prevention of Opportunistic Infections

Infection	Generic Name	Brand Name
Pneumocystis	TMP-SMX	Bactrim
	Dapsone	None (?)
	Pyrimethamine	Daraprim
	Atovaquone	Mepron
	Pentamidine	Nebupent, Pentam 300
Toxoplasmosis	TMP-SMX	
	Dapsone	
	Pyrimethamine	
MAC	Azithromycin	Zithromax, Zmax

III. LABORATORY TESTS LOINCS

Table 5. Laboratory Test LOINC Mapping

ESP Lab	Component Name	LOINC	LOINC Name	Positive Result
hiv_ag_ab	Antigen/antibody combination immunoassay	56888-1	HIV 1+2 Ab+HIV1 p24 Ag : ACnc : Pt : Ser : Ord : EIA	Positive Reactive Confirmatory testing is required
hiv_elisa	HIV-1 HIV-2 AB EIA HIV-1/2 ANTIBODY RAPID HIV RAPID POC HIV ANTIBODY SCREEN HIV 1 AND 2 PLUS O ANTIBODY HIV Ab(s), Donor	56888-1	**Use for AB portion of AG/AB test when overall result is not available. ** Use for rapid test where result is for AB only. (not ag/ab or confirmatory/differentiation) ** Use for HIV Donor tests	Reactive Positive
cd4	CD4 (#/volume)	32515-9	Deprecated CD4 cells [#/volume]: NCnc : Pt: XXX : Qn	N/A
cd4	CD4 (/100cells)	32516-7	Deprecated CD4 cells [/100 Cells] : NFr : Pt: XXX : Qn	N/A
hiv_pcr	HIV Qualitative RNA HIV1 PCR, QUALITATIVE HIV-1 DNA / RNA QUAL	5018-7	HIV 1 RNA [Presence] : ACnc : Pt : XXX : Ord : Probe.amp.tar	Detected
hiv_pcr	HIV 1 DNA, Qual	30245-5	HIV 1 DNA [Presence] : ACnc : Pt : Ser/Plas : Probe.amp.tar	Detected
hiv_pcr	HIV 2 DNA, Qual	25842-6	HIV 2 DNA [Presence] : ACnc : Pt : XXX : Probe.amp.tar	Detected
hiv_rna_viral	Quantitative Viral Load HIV 1 RNA QUANT	25836-8	HIV 1 RNA [#/volume] (viral load) : NCnc : Pt : XXX : Probe.amp.tar	> 200 copies/mL
hiv_rna_viral	HIV 2 RNA QUANT	69354-9	HIV 2 RNA [Units/volume] (viral load) in Serum or Plasma by NAA with probe detection	> 200 copies/mL

hiv_ab_diff	HIV 1/2 Antibody Confirmation/Differentiation	80203-3	HIV 1 and 2 Ab [Identifier] in Serum, Plasma or Blood by Rapid immunoassay	HIV-1 Positive HIV-2 Positive HIV-2 Positive with HIV-1 cross reactivity Positive
hiv_ab_diff	HIV 1 Antibody Differentiation	68961-2	HIV 1 Ab [Presence] in Serum, Plasma or Blood by Rapid immunoassay	Positive
hiv_ab_diff	HIV 2 Antibody Differentiation	81641-3	HIV 2 Ab [Presence] in Serum, Plasma or Blood by Rapid immunoassay	Positive
Deprecated Labs – Used Only For Historical Labs &/OR Case Detection				
hiv_elisa	Antibody, HIV1	29327-4	HIV1 Ab : ACnc : Pt : Body fld : QI : Ord	Reactive Positive
hiv_elisa	Antibody, HIV2	30361-0	HIV2 Ab [Presence] : ACnc: Pt : Ser : QI : Ord : EIA	Reactive Positive
hiv_elisa	Antibody, HIV1+2	43010-8	HIV 1+2 Ab [Presence]: ACnc : Pt : XXX : Ord	Reactive Positive
hiv_wb	Western Blot, HIV1+2	43185-8	HIV 1 & 2 Ab band pattern [interpretation] : Imp : Pt : Ser : Nom : IB	
hiv_wb	Western Blot, HIV1	34592-6	HIV 1 Ab [Presence] : ACnc : Pt : Body fld : Ord : IB	
hiv_wb	Western Blot, HIV2	5225-8	HIV 2 Ab [Presence] : ACnc : Pt: Ser : Ord : IB	
hiv_multispot	Differentiating Multispot	69668-2	HIV 1 and 2 Ab [Identifier] in Serum or Plasma by Rapid immunoassay	HIV Type 1 HIV Type 2 Positive

IV. NA CODES

Table 5. NA Codes for provider reporting fields

NA code	Description
NA-1746	Prescribing provider name
NA-1747	Prescribing provider NPI
NA-1748	Treatment encounter facility name
NA-1749	Treatment encounter facility address
NA-1750	Treatment encounter facility city
NA-1751	Treatment encounter facility state
NA-1752	Treatment encounter facility NPI
NA-1753	Primary care provider name
NA-1754	Primary care provider NPI
NA-1755	Ordering provider name
NA-1756	Ordering provider NPI
NA-1757	Lab ordering facility name
NA-1758	Lab ordering facility address

NA-1759	Lab ordering facility city
NA-1760	Lab ordering facility state
NA-1761	Lab ordering facility NPI
NA-1762	Managing treatment provider name
NA-1763	Managing treatment provider NPI

V. CODE MAINTENANCE STRATEGY

Search all incoming new labs for strings that might indicate relevance to HIV including:

- HIV
- Immunodef
- CD4