IMPLEMENTATION OF EMR REPORTING FROM ESP TO MAVEN

On-Boarding and Validation

Document Version 1.0

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

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Modification History

Version	Date	Modification	By
1.0	11/10/2017	• Original circulated version	MDPH/DPM

Intent: Provide an overview of all steps needed to have case reporting fully implemented for a reportable condition for participating clinical sites.

I.   BACKGROUND

The Electronic Support for Public Health (ESP) platform enables electronic reporting of incident cases of select notifiable diseases (HIV, HCV, HAV, HBV, chlamydia, gonorrhea, syphilis) and continuum of care information for a subset (HIV, HCV) to the Massachusetts Department of Public Health (MDPH). Information extracted from electronic medical records is reported to MDPH's web-based surveillance system, MAVEN, via ESP.

Case detection algorithms have been developed for several notifiable diseases ([see ESP public wiki](#)). These case detection algorithms have been preliminarily validated at other ESP sites. Each case detection algorithm must be validated at each new site following the process described in the next section.

II.   PROCESS

This section outlines the necessary steps for MDPH to bring electronic case reporting for selected diseases to Production in collaboration with the participating clinical site, Commonwealth Informatics, Inc. (CII), and the Department of Population Medicine (DPM) at Harvard Medical School and Harvard Pilgrim Health Care Institute.

Routine meetings (e.g., monthly) with technical representatives from MDPH, CII and the site will facilitate the process. These meetings should occur more frequently (e.g., weekly) as the team moves closer to production.

Step 1: Establish Connectivity in the Health Information Reporting Portal (HIRP)

Data can be sent to the HIRP via a webservice (using SOAPxmitter).

1. MDPH will provide the site with SOAP software and username/password key and .properties file. Instructions and support will be provided.
2. CII will help the site install the SOAP software, configure ESP to reference the SOAP installation, and establish connectivity to the HIRP staging portal.

Although preferable, this is not a prerequisite to validation, as test messages can be manually uploaded to the staging portal as necessary. However, it will need to be completed prior to live data testing.

Estimated time frame: 2-4 weeks

Step 2: Map Local Codes from ESP to MDPH

In order to receive messages in the HIRP, local codes from each site's EMR must be mapped to standardized codes.

1. The site, with assistance of SQL scripts provided by CII, will create a comprehensive, consolidated report of lab tests mapped for the case detection algorithm ("MAPPED LABS REPORT"). *Note there is no PHI involved in these reports.*
2. With assistance from the site, MDPH staff will determine the appropriate LOINC (test) and SNOMED (result) codes recognized by HIRP for each lab test and update the MAPPED LAB REPORT.
   a. Non-test variables (e.g., diagnosis codes, treatment information, etc.) will be mapped to MDPH standard codes in the same manner.
   b. MDPH staff will assist with mapping non-test variables to codes recognized by HIRP.
3. MDPH will create a site-specific domain in the HIRP staging (test) portal and give the appropriate people access (site staff and CII, if appropriate).
   a. CII will train the site on how to update the esp conf_labtestmap table with the MDPH approved LOINC and SNOMED codes. The site will then update this data in ESP.
   b. MDPH will train the site on the use HIRP for portal mapping and maintenance.
   c. The site, after training, will update the ESP conf_labtestmap table and the portal with all approved mappings.

Estimated time frame: 2-6 weeks per disease

Step 3: Validation of ESP Detection Algorithm against Site's EMR

1. The site, with assistance of SQL provided by CII, will create a list of cases identified by ESP at the site during a specified time period ("ESP CASE LINE LISTING REPORT"). *Note that this report does contain PHI.*
   a. The site will use this list to confirm the case status via EMR/chart review. The site will summarize their findings and report to MDPH on their findings.
   b. The site will generate their own internal list of patients with the infection of interest and compare it against the ESP generated list, with support from CII. The site will summarize their findings and report to MDPH on their findings.
      i. Sensitivity, specificity, and positive predictive value (PPV) of the algorithm will be calculated by MDPH based on the findings.

Estimated time frame: 1-2 months

Step 4: Validate ESP cases against MAVEN

1. Once the above step is complete, MDPH will validate this list of cases identified by ESP (ESP CASE LINE LISTING REPORT) against what is already in MAVEN during the same time period by doing individual case look up. *Note that this report does contain PHI.*
2. MDPH staff will work closely with the site to understand any discrepancies and document findings.

Estimated time frame: 4-6 weeks

Step 5: HL7 Syntax Message Validation

1. CII will train the site on how to generate individual HL7 xml messages using the esp case_report command and transmit them to the HIRP staging portal.
   a. Connectivity from site TEST implementation to HIRP Staging site is required.
2. The site will send sample HL7 xml messages to the HIRP staging portal.
3. MDPH will review sample messages and ensure that:
   a. HL7 syntax is correct and meets HL7 231 implementation guide and MA requirements.
   b. Messages do not create errors in the HIRP staging site.

Estimated time frame: 4 weeks

Step 6: HL7 Message Content Validation

1. MDPH will review sample messages and ensure that:
   a. All mandatory fields are complete, for example:

   - First name
   - Last name
   - Date of birth
   - Gender
   - Race
   - Ethnicity
   - Patient address
   - Test
   - Result
   - Result date
   - Specimen number
   - Specimen source
   - Specimen date
   - Ordering provider name
   - Ordering provider address

   b. Supplemental fields are complete, where appropriate. For example:

   - Treatment
   - Country of birth
   - Insurance status
   - Housing status
   - Diagnostic codes
   - Current pregnancy status

   c. Care continuum data elements are complete when relevant. Examples below for HIV:
   - New medical visits for HIV care
   - Serial CD4 and HIV viral load results
   - Antiretroviral prescriptions
   - Prophylactic antibiotic prescriptions

2. MDPH task: Sample messages will be dropped into MAVEN testing environment to ensure that:
   a. Question Packages are being completed appropriately.
   b. Deduplication is occurring as expected.
   c. Message creates case (as opposed to Unknown) events.
   d. Tests with numeric only results append appropriately.
   e. Prospective information (continuum of care data elements) append to prevalent cases already in MAVEN as well as to incident cases reported via ESP to MAVEN.

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3. Incremental reporting will be permissible to the extent that is satisfactory to MDPH.
   a. For example, MDPH may decide that ESP can begin reporting cases before all continuum of care variables are accepted by MAVEN.

Estimated timeframe: 4-6 weeks

Step 7: Data Element Validation

1. The site will review medical charts for a random sample of cases identified by ESP.
2. All data elements (listed in 1a-c from Step 6) will be tracked from EMR to ESP, and ESP to MAVEN to ensure that these fields are complete, accurate, and consistent.
   a. CII will be available for technical assistance with reporting, SQL, or ESP.

Estimated timeframe: ~4 weeks

Step 8: Live Data Testing

1. Once HL7 message syntax and content are validated, the site will send "live" (i.e. not historic) data to the HIRP staging site for continued testing for a period of at least 1 month.
   a. Connectivity from site LIVE implementation to HIRP Staging site is required.
   b. CII will be available to train the site on how to turn reporting to staging "live and automated" by implementing daily batch processing and case reporting for cases via toolkit of shell scripts/cron jobs
2. MDPH will review live messages daily for syntax and content.
3. In addition, analysis will be done on batches to identify any systematic issues (e.g., gaps in data, unnecessary defaults, etc.).

Estimated timeframe: at least 4 weeks

Step 9: Moving to Production

1. Once validation and testing activities are completed as indicated below, case reporting will move into production.
   a. HL7 message syntax and content have been validated
      i. 100% completeness of mandatory variables.
      ii. 80% completeness of supplemental/non-mandatory variables
   b. Confirmation from MDPH that case detection algorithm is validated.
      i. All cases and messages expected to in MAVEN testing should be there.
      ii. If any cases or messages are missing, there must be documentation as to why they are missing and confirmation from MDPH whether or not this is acceptable.
2. CII will help the site ensure that the SOAP properties are correctly configured for the live site.
   a. Connectivity from site LIVE implementation to HIRP Production site is required.

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3. CII will help the site implement the daily batch email report, which will help ensure that reporting is happening on a daily basis.

Step 10: Ongoing Monitoring/Routine Maintenance

Once case reporting moves to production, MDPH will regularly monitor cases reported.

1. On a daily basis, MDPH will:
   a. Validate message syntax and content, following processes detailed in a separate document.
   b. Review connectivity, and the smooth flow of data.
      i. Sites will be expected to send a (empty) batch, even if there are no reports for that day. MDPH will contact the site if no batches are sent.
2. On a quarterly basis, MDPH will evaluate:
   a. Counts of cases reported over time for each site
   b. Gaps or systematic changes in reported fields
   c. Any newly identified tests for reportable labs that need to be mapped