Message Mapping Guide (MMG) Development Update: Status of Work, Lessons Learned, and Enhancements

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Overview

- Status of MMG development work
- Lessons Learned from the 1st Year of NMI*
- Diagram of Steps in MMG development
- Message Restructuring and Content Changes
- Data Element Assessment for Harmonization

*National Notifiable Diseases Surveillance System Modernization Initiative*
Status of Message Mapping Guides (MMGs)

- **Pilot test-ready MMGs**
  - Generic v2 MMG
    - Must be used with all new disease-specific MMGs
    - Sent alone as case notification for specific conditions
  - Hepatitis
  - Sexually Transmitted Diseases, except for congenital syphilis
  - Congenital Syphilis

- **Mumps and Pertussis MMGs will be pilot test-ready in August 2015**

- **New MMG Development Priorities**
  - Arboviral, Varicella, Invasive Pneumococcal Disease (IPD)
Some of the Lessons Learned this Year Related to Process (1 of 2)

- Prepare CDC Programs to work with us before MMG development begins
  - Includes vetting of data elements & valid values with jurisdictions

- Document and verify requirements with CDC Program before MMG development begins

- Need representation from all programmatic and technical groups at the beginning of the MMG development process

- Build specific quality assurance (QA) steps into the process; QA should be conducted across Teams, together
Some of the Lessons Learned this Year Related to Process (2 of 2)

- Need technology tools to enable requirements to be used and managed across all Teams (MMG development, MVPS, and NBS)
- Need better change control management
- Need more effective governance across all Teams working in a matrix environment
MMG Development and Implementation Process

The diagram illustrates the lifecycle stages of the Message Mapping Guide (MMG) development and implementation process. It includes:

1. **Program Pre-work**
   - Provide current documentation
   - Documentation review
   - Data requirements
   - Program design

2. **Requirements Analysis**
   - Identify and analyze data element requirements
   - Conduct internal GAP analysis
   - Update and consolidate data element list

3. **Message Design and Development**
   - Prepare to create MMG
   - Conduct MMG creation planning meeting
   - Develop draft MMG
   - Update draft MMG
   - Perform quality assurance review
   - Finalize MMG

4. **Message Reconciliation and Finalization**
   - Receive and compile external review comments
   - Review and issue draft MMG
   - Evaluate MMG comments
   - Finalize MMG
   - Deliver draft MMG to development team

Legend:
- APHL: Association of Public Health Laboratories
- LDR: Leadership
- MSV: Messaging & Vocabulary
- MPPS: Message Validation Processing and Provisioning System
- MIBS: Message Interchange-Based System
- NMS: NDSIS Modernization Initiative
- PDM: Program
- SOT: Surveillance Operation Team
- VADS: Vocabulary Access and Distribution System

Change Control Board:
The board will review and act on proposed MMG changes that potentially affect the strategy or timeline.
MMG Restructuring & Content Changes

- Opened the HL7 structure in the PHIN message specification to support inclusion of previously restricted OBX segments
  - Added Next of Kin (NK1), Specimen (SPM), Notes and Comments (NTE)

Use of NK1

Old format for mother’s information

1 See “Case Notification Message Restructuring: A Summary of Structural and Content Changes” for more details.
MMG Restructuring & Content Changes

- Newly implemented Laboratory and Vaccine Templates
  - Support inclusion of laboratory and vaccination findings in the case notification
  - Implemented to promote the use of harmonized data elements
  - Are optional, can be used by jurisdictions if the elements exist within the surveillance system
MMG Restructuring & Content Changes

- Standard identifiers for the question concept are used where applicable (based upon LOINC, SNOMED, RXNORM)
- Detailed HL7 mapping information, including implementation notes with sample segments
- Data elements coming from the value set (e.g. “Signs & Symptoms” and “Complications”)
MMG Restructuring & Content Changes

- Incorporated instructions for conveying “unknown”

<table>
<thead>
<tr>
<th>Data Element (DE) Name</th>
<th>DE Identifier Sent in HL7 Message</th>
<th>DE Code System</th>
<th>Data Element Description</th>
<th>Data Type</th>
<th>CDC Prior</th>
<th>HL7 Message Cont</th>
<th>HL7 Data Type</th>
<th>HL7 Usage</th>
<th>HL7 Cardinality</th>
<th>HL7 Implementation Notes</th>
<th>Sample Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of previous pregnancies</td>
<td>75201-4</td>
<td>LN</td>
<td>Number of Mother’s previous pregnancies</td>
<td>Numeric</td>
<td>P</td>
<td>OBX segment with OBX-3:1=75201-4 OBX-5:2=Numeric value</td>
<td>SN</td>
<td>RE</td>
<td>[0..1]</td>
<td>For unknown number of previous pregnancies, it is recommended to populate OBX-5 with “99”</td>
<td>OBX(00</td>
</tr>
<tr>
<td>Number of live births</td>
<td>75202-2</td>
<td>LN</td>
<td>Number of Mother’s live births</td>
<td>Numeric</td>
<td>P</td>
<td>OBX segment with OBX-3:1=75202-2 OBX-5:2=Numeric value</td>
<td>SN</td>
<td>RE</td>
<td>[0..1]</td>
<td>For unknown number of live births, it is recommended to populate OBX-5 with “99”</td>
<td>OBX(00</td>
</tr>
<tr>
<td>Last menstrual period (LMP)-(before delivery)</td>
<td>75203-0</td>
<td>LN</td>
<td>Date of Mother’s last menstrual period (MMDDYYYY)</td>
<td>Date</td>
<td>P</td>
<td>OBX segment with OBX-3:1=75203-0 OBX-5=date in YYYYMMDD format</td>
<td>DT</td>
<td>RE</td>
<td>[0..1]</td>
<td>For unknown date, it is recommended to populate OBX-5 with “9999999999”</td>
<td>OBX(00</td>
</tr>
<tr>
<td>Date of first prenatal visit</td>
<td>75200-8</td>
<td>LN</td>
<td>Date of Mother’s first prenatal visit (MMDDYYYY)</td>
<td>Date</td>
<td>P</td>
<td>OBX segment with OBX-3:1=75200-8 OBX-5=date in YYYYMMDD format</td>
<td>DT</td>
<td>RE</td>
<td>[0..1]</td>
<td>For unknown date, it is recommended to populate OBX-5 with “9999999999”</td>
<td>OBX(00</td>
</tr>
</tbody>
</table>
MMG Restructuring & Content Changes

- **Used 3 OBR segments to create sections in message**
  - Helps to organize content and helps map data elements from data source
  - Three segments
    - **Epidemiological** – for all case report data elements, including epidemiologically interpreted laboratory information
    - **Laboratory** – optional segment for lab data elements from a Laboratory Information System (LIS) or Electronic Laboratory Report (ELR), or from faxed or paper lab reports
    - **Vaccine** – optional segment to send core data elements from an Immunization Information System (IIS) or from a non-electronic vaccination card or report
Data Element Assessment for Harmonization

- NNDSS staff collected data elements from three Office of Management and Budget (OMB) packages
  - OMB Control # 0920-0728 (NNDSS consolidated package)
  - OMB Control # 0920-0573 (HIV)
  - OMB Control # 0920-0026 (Tuberculosis)

- Repository of data elements created

- Reviewed 5942 data elements for 90 NNCs and Generic
Data Element Assessment

- Grouped elements into 6 high level categories:
  - Demographics (n=379)
  - Clinical (n=1031)
  - Treatment (n=304)
  - Laboratory (n=1403)
  - Vaccine (n=224)
  - Epidemiological (n=2601) (This category includes a variety of sub-categories such as travel, food exposures, social history, etc.)

- Created “Summary Reports” to describe categories, sub-categories, and themes that might be good candidates for harmonization
### Category: Epidemiologic Information
#### Sub-Category: Travel

- **52 conditions out of 90 ask questions about travel**
- **12 themes**

<table>
<thead>
<tr>
<th>Theme</th>
<th>In-Scope (Y/N)</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Travel</td>
<td>Y</td>
<td>5</td>
</tr>
<tr>
<td>Foreign Travel</td>
<td>Y</td>
<td>6</td>
</tr>
<tr>
<td>Domestic Travel</td>
<td>Y</td>
<td>7</td>
</tr>
<tr>
<td>Travel Destination(s)</td>
<td>Y</td>
<td>7-8</td>
</tr>
<tr>
<td>Foreign Destination</td>
<td>Y</td>
<td>8-9</td>
</tr>
<tr>
<td>Domestic Destination</td>
<td>Y</td>
<td>9-10</td>
</tr>
<tr>
<td>Destination Type</td>
<td>Y</td>
<td>10</td>
</tr>
<tr>
<td>Date(s) of Travel</td>
<td>Y</td>
<td>11-14</td>
</tr>
<tr>
<td>Duration of Travel</td>
<td>Y</td>
<td>14</td>
</tr>
<tr>
<td>Reason for Travel</td>
<td>Y</td>
<td>15</td>
</tr>
<tr>
<td>Immigrated</td>
<td>Y</td>
<td>16</td>
</tr>
<tr>
<td>Mode of Travel</td>
<td>Y</td>
<td>16-17</td>
</tr>
</tbody>
</table>
### Sub-Category: Travel
#### Theme: Any Travel

- 12 conditions ask this question 12 different ways

<table>
<thead>
<tr>
<th>Condition</th>
<th>Label/name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Travel</td>
<td>Traveled out of county, state, or country?</td>
</tr>
<tr>
<td>Babesiosis</td>
<td>Travel</td>
<td>In the eight weeks before symptom onset or diagnosis (use earlier date), did the case-patient travel (check all that apply)?</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>Travel</td>
<td>In the 6 months prior to illness onset did the subject travel outside of the state of residence?</td>
</tr>
<tr>
<td>Cholera</td>
<td>TRAVEL</td>
<td>Exposure to travel outside home state in previous 7 days?</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td>Travel Prior To Onset</td>
<td>Did the patient travel prior to onset of illness?</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td>Travel Questions Indicator</td>
<td>If patient has traveled, then display the following questions</td>
</tr>
<tr>
<td>Giardia</td>
<td>Travel Prior To Onset</td>
<td>Did the patient travel prior to onset of illness?</td>
</tr>
<tr>
<td>Giardia</td>
<td>Travel Questions Indicator</td>
<td>If patient has traveled, then display the following questions</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>Travel</td>
<td>Did the subject travel out of the county, state, or country in the 30 days prior to symptom onset?</td>
</tr>
<tr>
<td>Novel Influenza A</td>
<td>Epi Risk - Travel</td>
<td>In the 10 days prior to illness onset, did the patient travel?</td>
</tr>
<tr>
<td>Rabies, Human</td>
<td>Travel</td>
<td>Did the patient have a recent (prior 12 months) history of travel?</td>
</tr>
<tr>
<td>SARS</td>
<td>Travel to SARS area</td>
<td>In the 10 days prior to symptom onset did the patient have travel to foreign or domestic area with documented or suspected recent local transmission of SARS cases?</td>
</tr>
<tr>
<td>STEC</td>
<td>Any travel</td>
<td>Patient spent all or some of the 7 days before illness onset outside of their state of residence</td>
</tr>
<tr>
<td>Vibriosis</td>
<td>TRAVEL</td>
<td>Exposure to travel outside home state in previous 7 days?</td>
</tr>
</tbody>
</table>
Data Element Assessment Summary Report

Last updated: 4/29/2013

Data Element Harmonization Project

Harmonization Summary Report
Category: EPIDEMIOLOGIC INFORMATION
Sub-Category: TRAVEL

INDEX

• Summary

• Part I – Category Scope Identification – basic information defining the team and the scope of its investigation

• Part II – Theme Information – a list of the data elements within each theme of the travel sub-category.

• Part III – Discussion Points & Recommendations – team-based advice on harmonized data elements.

• Part IV – Appendix – Previous Efforts and Current Resources – information on previous harmonization efforts and data elements currently available in PHIN Vocabulary Access and Distribution System (VADS).
Data Element Harmonization Proposal

- **Goal:** Harmonize NNDSS data elements across CDC programs in order to lessen the burden on jurisdictions for collecting and reporting the data

- **Recommended Approach**
  - NNDSS staff to identify candidate data elements while developing new MMGs; develop background information
  - Workgroups with representation across CDC led by CDC programs; consider SurvSAG role
  - Reporting jurisdictions and CSTE involvement
  - Up front: establish ground rules, agree on how to adjudicate disagreements, define success and outcomes
  - Carefully document all discussions and decisions
  - Surveillance Leadership Board to provide oversight of process
Data Element Harmonization Proposal

- Create a data element repository of harmonized elements to allow easy identification and use
  - Review potential repositories (PHIN VADS, NLM, etc); plan for continuously maintaining and curating the repository

- DHIS will incorporate harmonized data elements into MMGs as they are developed or updated
NNDSS Web Site

- URL to the NNDSS Web Site: http://wwwn.cdc.gov/nndss/
If you have questions, please contact:
William Morrill (wem1@cdc.gov) or
Ruth Jajosky (raj3@cdc.gov)
Appendix
Vaccine Template

- Establishes templates to represent laboratory and vaccine data elements in the HL7 message across all MMGs
  - Similar information transmitted in a structured format
  - Allows similar data to be processed in the same way
  - Does not change format for data collection

Vaccine Template Data Elements

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Vaccine Messaging Template</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccine administered product type</td>
<td>OBR= Vaccine Information</td>
</tr>
<tr>
<td>Vaccine administered date</td>
<td>OBX-3: Data Element Name (question)</td>
</tr>
<tr>
<td>Vaccine dose number</td>
<td>OBX-5: Value (answer)</td>
</tr>
<tr>
<td>Vaccine product manufacturer</td>
<td>Repeating Groups (Multiple Data Elements linked using OBX-4 sub-id)</td>
</tr>
<tr>
<td>Vaccine Lot Number</td>
<td></td>
</tr>
<tr>
<td>Vaccine Lot Expiration Date</td>
<td></td>
</tr>
<tr>
<td>Vaccine Event information source</td>
<td></td>
</tr>
<tr>
<td>Immunization Schedule used</td>
<td></td>
</tr>
<tr>
<td>Exemption/refusal reason (not applicable to every</td>
<td></td>
</tr>
<tr>
<td>vaccine)</td>
<td></td>
</tr>
</tbody>
</table>

OBR= Vaccine Information
OBX-3: Data Element Name (question)
OBX-5: Value (answer)
Repeating Groups (Multiple Data Elements linked using OBX-4 sub-id)
<table>
<thead>
<tr>
<th>Data Element Name - OBX</th>
<th>HL7 Field</th>
<th>Data Element Name - SPM</th>
<th>HL7 Field</th>
<th>Data Element Name - OBR</th>
<th>HL7 Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Performed Name</td>
<td>OBX-3</td>
<td>Specimen ID</td>
<td>SPM-2</td>
<td>Filler Order #</td>
<td>OBR-3</td>
</tr>
<tr>
<td>Test Result - Coded Qualitative (non-organism)</td>
<td>OBX-5</td>
<td>Specimen Type</td>
<td>SPM-4</td>
<td>Test Ordered Name</td>
<td>OBR-4</td>
</tr>
<tr>
<td>Test Result - Coded Organism</td>
<td>OBX-5</td>
<td>Specimen Source Site</td>
<td>SPM-8</td>
<td>Observation Date/Time</td>
<td>OBR-7</td>
</tr>
<tr>
<td>Test Result - Numeric</td>
<td>OBX-5</td>
<td>Specimen Description</td>
<td>SPM-14</td>
<td>Results Rpt/Status Chng - Date/Time</td>
<td>OBR-22</td>
</tr>
<tr>
<td>Units of Measure</td>
<td>OBX-6</td>
<td>Specimen Collection Date/Time</td>
<td>SPM-17</td>
<td>Result Status</td>
<td>OBR-25</td>
</tr>
<tr>
<td>Test Result - Text</td>
<td>OBX-5</td>
<td></td>
<td></td>
<td>Reason for Study</td>
<td>OBR-31</td>
</tr>
<tr>
<td>Test Result - Interpretation Flag</td>
<td>OBX-8</td>
<td></td>
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<td></td>
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<tr>
<td>Test Result - Reference Range</td>
<td>OBX-7</td>
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<tr>
<td>Observation Result Status</td>
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<td>Specimen collection date</td>
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<td>Test Method</td>
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<td>Specimen Analyzed Date</td>
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<td>Performing Laboratory Name</td>
<td>OBX-23</td>
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<tr>
<td>Performing Person Name</td>
<td>OBX-25</td>
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<tr>
<td>Test Result Comments</td>
<td>NTE Segment</td>
<td></td>
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</tr>
</tbody>
</table>
For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
Visit: http://www.cdc.gov | Contact CDC at: 1-800-CDC-INFO or http://www.cdc.gov/info

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