Module 3: Variable Mapping Utility

Variable Mapping Overview

The Variable Mapping utility provides sites the ability to map electronic health record (EHR) variables to standardized MPOG concepts. This process of standardizing terms across multiple EHRs and across multiple sites allows for common data elements to be used for research or quality improvement purposes. For example, one organization may document ‘Handoff Performed in PACU,’ another site may document ‘PACU Handoff,’ and a third site may document ‘PACU Handover Complete.’ All of these concepts would be mapped to the MPOG Concept: ‘Compliance- PACU/ICU Handoff of Care Performed, Report Given’ as these concepts are all indicative of a PACU transfer of care conversation. Once a variable is mapped, source data from the local EHR will always map to the corresponding MPOG concept automatically unless mapping is modified. The MPOG Variable Mapping utility simplifies the mapping process by allowing MPOG clinical reviewers to select data variables (source concepts) and match them to corresponding MPOG concepts.

Important Note: Institutional data needs to be pulled into the MPOG database before mapping can begin. Typically, sites begin mapping with a small amount of data (one day to one week) and then load more data after mapping is started. Usually sites will automate the process of applying mappings after one month of data is loaded and mapped in the database. Automatic updates are typically scheduled to occur each night.

Premapping

For new Epic sites, a select amount of variables will automatically be mapped prior to beginning manual mapping. Sites will be asked to run a script to complete the premapping. These mapped and excluded variables will be available for review in the variable mapping utility.
Getting Started

1. Open the MPOG Application Suite and click on the ‘Variable Mapping’ icon in the MPOG Application Suite.

2. The ‘Variable Mapping’ utility should open and look similar to the image below. The left side of the utility will represent your institution’s variables and the right side will reflect MPOG concepts.
3. You will also notice four fields within the MPOG Configuration that allow you to filter by category. These include Mapping Type, Organization, Display Mode, and Search Filter.
   a. **Mapping Type:** This is a general mapping category that can be further filtered to the following subcategories.
   b. **Organization:** This field will be populated with your institutional name. There may be additional sites in the dropdown menu for multi-site institutions in which you are assigned (i.e. Henry Ford Detroit, Henry Ford West Bloomfield). This allows you to map separately. For further direction on mapping for multi-site institutions, please contact the MPOG Coordinating Center.
   c. **Display Mode:** This feature allows you to filter by ‘All Mapped Variables,’ ‘Unmapped Variables,’ or ‘Mapped Variables.’
   d. **Search Filter:** This function allows you to search for a specific Epic variable.

![MPOG Configuration](image-url)
4. To utilize the category filter option, click on the ‘Mapping Type’ field. A dropdown menu will appear and you may select from the various options:

5. Select from the desired category from the ‘Mapping Type’ dropdown menu, as shown below.

6. In the example below, we have filtered ‘Mapping Type’ by ‘Race.’
7. Once the desired ‘Race’ has been selected from the dropdown menu, you will notice a variety of race related variables populate the window as shown below. You may notice lines of existing variables on the left side of the screen if variables have been populated or mapped by the MPOG Coordinating Center technical team or premapping has been completed.

8. Click the ‘Race’ variable you wish to map. In this example, we have selected ‘American Indian/Alaska Native.’ Once the row has been selected, it will turn blue and a corresponding “guess” MPOG concept will appear in the ‘Description’ field on the right side. If several options appear, you can click on one of the bold terms above the MPOG concept window to narrow the search. If the desired concept does not appear, use the search filter field to modify your search.
9. Click the **Map** button in the center of the screen. Your variable is now mapped to an MPOG concept. The “Mapped As” column will be updated to reflect this change.

10. You may also filter by ‘Display Mode’ to visualize ‘All Variables,’ ‘Unmapped Variables Only,’ or ‘Mapped Variables’ to focus mapping efforts. By selecting from the dropdown menu, only the variables within the selected category will appear.
Additional Functions within Variable Mapping

‘EXAMINE’

1. The ‘Examine’ function allows you to view the Epic variable in greater detail by displaying cases using the concept in your AIMS Dictionary. This is beneficial when you desire additional context related to the variable you wish to map.

2. Highlight the variable row you wish to examine and click [Examine].

3. A window will open containing detailed information related to the selected variable.
‘UNMAP’
The ‘Unmap’ feature allows you to unmap incorrectly mapped variables at any time. Simply select and highlight the variable in the MPOG side, and click 'Unmap'.

‘EXCLUDE’
The ‘Exclude’ function allows you to exclude selected variables from mapping. The Coordinating Center will advise you on which variables are appropriate for exclusion. Extreme caution must be applied when excluding variables from mapping, especially within the ‘Administration Route’ mapping type, as ALL data associated with ‘route’ will be excluded.

Highlight the variable(s) you wish to exclude from mapping and click 'Exclude'. Excluded variables will turn pink.
AUTO SEARCH
While auto search is ON, the variable name that is selected on the left hand side will auto populate in the search filter on the right side. Clicking the auto search button will turn this function OFF and will not auto populate the search filter.

AUTO SELECT
After mapping a variable on the left hand side, having auto select ON will automatically jump to the next variable. To turn this function OFF, click the “auto select” button.
EXPORT
You can export all variables and their mappings to an excel spreadsheet through the export button.

Tips for Mapping Success
Focus on mapping variables with high row counts (‘Times Used’). Once you have mapped the majority of high row count variables, you can begin to focus your attention to mapping the lower row count variables that may be relevant for anesthesia research or quality purposes.
GROUPS TO MAP FIRST - Do not exclude in any of these categories.

a. Race
b. Gender
c. Ethnicity
d. Procedure Service
e. Admission Type
f. Staff Type

GROUPS TO MAP LAST

g. Lab Type
   i. Map variables that are important to surgical/anesthesia care i.e. Hgb/Hct/Creatinine/Troponin/Glucose. Focus on mapping labs that MPOG has concepts for and exclude the rest

h. Administration Type
   i. This category includes IN’s and OUT’s such as fluids, medications, blood products, EBL and urine output.
   ii. Exclude “volume (mL)” medication variables.
   iii. **Exclude all physiologic and gas flow variables from this mapping group

i. Administration Route
   i. Do Not Exclude in this category – map unspecified concepts to “Other”

j. Units of Measurement Administration
   i. Do not exclude in this category – leave those variables without a corresponding MPOG concept unmapped

k. Observation Detail Type
   i. These are observation Details. Map Observation Type first.

l. Observation Type (procedure notes)
### CATEGORY EXCLUSION RULES

<table>
<thead>
<tr>
<th>CAN EXCLUDE</th>
<th>DO NOT EXCLUDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration Type</td>
<td>Administration Route</td>
</tr>
<tr>
<td>Observation Type</td>
<td>Units of Administration</td>
</tr>
<tr>
<td>Observation Type Detail</td>
<td>Room Type</td>
</tr>
<tr>
<td>Lab Type</td>
<td>Procedure Type</td>
</tr>
</tbody>
</table>

### VARIABLE TYPE MAPPING GUIDE – EPIC sites only.

<table>
<thead>
<tr>
<th>Variable Type</th>
<th>Description</th>
<th>Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEV-* variables</td>
<td>Timed Event notes</td>
<td>Most reliable when looking for timing of events (i.e. intubation/extubation)</td>
</tr>
<tr>
<td>EAP/HLX-* variables</td>
<td>Procedure Note Documentation</td>
<td>Provides the details associated with a procedure: size, number of attempts etc. Observed time is not always populated. If no time associated with EAP/HLX note, map related LEV note as well.</td>
</tr>
<tr>
<td>FLO-* variables</td>
<td>Data from flowsheet</td>
<td>Data from flowsheet. LDA documentation corresponding to placement, removal etc. Usually duplicate doc.</td>
</tr>
<tr>
<td>CT-*variables</td>
<td>Case Tracking variables</td>
<td>Exclude these if multiple variables show for event times. *If you do not have an LEV variable for a certain concept you will need to include the CT variable.</td>
</tr>
<tr>
<td>AT-*variables</td>
<td>Attestations</td>
<td>Exclude or leave unmapped</td>
</tr>
</tbody>
</table>
AIRWAY VARIABLE MAPPING - (ETT/LMA/Intubation/Extubation), regional and neuraxial

- Map LEV/HLX/EAP variables
  - Exclude FLO variables associated with these concepts if both an HLX/EAP and LEV variable exists.
- If duplicate variables exist for critical times such as anesthesia start/end, surgery start/end, In room times, etc. can exclude the CT variables as these come from nursing. If there are only nursing (CT) variables, keep them and map (Phase I, Phase II in/out times, etc.). Bottom line: Anesthesia documentation is preferred but adopt nursing documentation if anesthesia documentation is not available for critical times/events.
How Mapping Translates to MPOG Case Viewer

1. After you continue mapping, you will notice a growing number of pink, green, and white rows on the left side of the screen.
   a. **Pink** rows represent variables excluded from Import.
   b. **Green** rows represent variables mapped.
   c. White rows represent unmapped variables.
2. Mapped variables within the ‘Observation Type’ and ‘Observation Detail Type’ section of Variable Mapping utility will become visible in the ‘chart’ section of case viewer under the physio, ventilator, flowsheet and notes section:

3. Mapped variables within the ‘Administration Type’ section of the Variable Mapping utility will populate to the medication, input and output sections.
4. Utilizing the MPOG Concept Browser utility will facilitate efficient identification of corresponding MPOG concepts. Please reference **Module 2: Concept Browser** for more information.

**Concept Browser**

Please select a concept type and query string:

- **Concept type**
  - [All concept types]

- **Query string**
  - propof

**Count Mode**

- Concept occurrences

- Hide inactive concepts

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<table>
<thead>
<tr>
<th>ID</th>
<th>Concept Name</th>
<th>Concept Type</th>
<th># of Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>10377</td>
<td>PROPOFOL</td>
<td>Intraoperative Medications (Administered Mixtures)</td>
<td>16,221,110</td>
</tr>
<tr>
<td>10378</td>
<td>PROPOFOL W/ REMIFENTANIL 10 MG/ML + 5 MG/ML</td>
<td>Intraoperative Medications (Administered Mixtures)</td>
<td>247</td>
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<tr>
<td>10453</td>
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<td>Intraoperative Medications (Administered Mixtures)</td>
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<td>10572</td>
<td>PROPOFOL W/ KETAMINE 10MG/ML + UNSPECIFIED KETAMINE</td>
<td>Intraoperative Medications (Administered Mixtures)</td>
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<td>10577</td>
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<td>10579</td>
<td>PROPOFOL W/ KETAMINE 10 MG/ML + 2 MG/ML</td>
<td>Intraoperative Medications (Administered Mixtures)</td>
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<tr>
<td>10597</td>
<td>PROPOFOL W/ ALFENTANIL 10 MG/ML + 50 MG/ML</td>
<td>Intraoperative Medications (Administered Mixtures)</td>
<td>863</td>
</tr>
</tbody>
</table>