Standardized Data File - User Guide

Version 2021

Updated 12/22/2022

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1. Introduction

The Multicenter Perioperative Outcomes Group (MPOG) is a consortium of hospitals across the United States, which seeks to improve experiences of patients receiving care by anesthesia clinicians. Since its inception in 2008, MPOG has developed policies, procedures, and the technical infrastructure required to conduct large scale research, create quality improvement initiatives, educate caregivers, and guide healthcare administration.

The goal of MPOG research is to systematically transform real-world perioperative health data into actionable knowledge. The Perioperative Clinical Research Committee (PCRC) is made up of physicians and researchers at all participating MPOG institutions and governs the research efforts of MPOG, by reviewing all submitted proposals and tracking the progress of ongoing projects. The committee ensures the appropriateness of the clinical research conducted within MPOG and the use of MPOG resources. The PCRC, together with the MPOG coordinating center research team has developed the Standardized Data File to help MPOG researchers conduct studies as efficiently as possible.

The standardized data file is a pre-packaged MPOG dataset of cases within a specified time frame that is ready to distribute quickly after an approved PCRC proposal. The data file contains commonly requested, validated case-level phenotypes (i.e. summary variables computed or derived from raw data) for each included case, as well as raw administrative data associated with the patient. A new standardized data file will be released annually with additional data from new MPOG centers, more recent cases, and additional validated phenotypes.

This user guide provides information on the included study population and phenotypes, the structure of the data, and the process for accessing the data.

2. Phenotypes: Quality and Updates

Phenotypes help transform messy, real-world electronic health record data into structured, clinically useful inferences about the case and the course of clinical care. Each phenotype may be a computation, recode, or other combination of variables in the raw dataset that summarize information through one variable. Examples include the *BMI phenotype* (computed from weight and height) and the *Last Known Alive* (which is derived from the latest date that the patient has an anesthesia or lab record in the MPOG database). At MPOG, these phenotypes are subjected to rigorous development and validation processes based on the logical application of multiple raw data elements associated with each case.

New phenotypes are created and validated on an ongoing basis by MPOG quality and research staff before being released for use in research and quality improvement initiatives. For a full description of the logic and definition for each phenotype in the standardized data file, please refer to **Appendix 1**. While the set of phenotypes included in the standardized data file remains fixed for each version release, if inconsistencies are found in the underlying logic for a phenotype or with an institution's mappings for that phenotype, MPOG will release update notes outlining the change(s) under the FAQ section of this document.

Additional information on MPOG phenotypes can be found by accessing the MPOG research website → Tips & Tricks → "Transforming Raw Data into Clinical Inferences: Phenotypes"

MPOG's full collection of phenotypes can be found by exploring the phenotype browser, available on the MPOG website → Tools → Phenotype Browser https://phenotypes.mpog.org/.

3. Case Inclusion Criteria

The **standardized data file version 2021** includes all MPOG cases occurring at participating MPOG medical centers throughout the **United States** which meet the intraoperative research standard definition from **January 1, 2016 through December 31, 2021**. Please note that participating sites must be contributing cases to MPOG at the time of the data pull in order for their data to be included in that year's standardized data file. Otherwise, cases from those sites will not be included until the subsequent standardized data file release. Version 2021 contains **four separate tables** that can be merged and analyzed together if desired as described in Section 4: Table Descriptions.

To be included in the standardized data file, each case must achieve certain data standards, defined as the intraoperative research standard, to ensure it is a case suitable for research. The intraoperative research standard was developed by members of the research and quality teams at the MPOG coordinating center and is continually re-evaluated to ensure reliability.

To meet the **intraoperative research standard**, a case must satisfy all of the following criteria:

- There must be a date and time noted for the beginning and end of the anesthetic procedure. If multiple start times exist, the earliest is used, and the start time must be before the end time. There is only one start and end time for each case.
- If there is a patient in room time for a case, the case will be included if it is after, but not more than 30 minutes prior to the listed anesthesia start time. If a patient in room time is not present the case will still be included.
- For general anesthetic cases, the case duration must be greater than or equal to 10 minutes.
- For anesthetic cases when general anesthetic was not used, the case duration must be greater than or equal to 5 minutes.
- There must be an age listed for the patient in the data.
- There must be data regarding the patient's sex (either male or female). This phenotype does not reflect the patient's gender identity.
- The data must include an American Society of Anesthesiology Physical Status classification score (ASA), between 1 and 6, which gives information on the patient's overall health and potential risks in anesthetic management. A case is excluded if there are multiple ASA statuses, the ASA status is missing, or an unused classification number that is present.
- There must be at least one blood pressure value recorded in the case data, which cannot be an artifact or other invalid metric.
- At least one intraoperative medication must be listed as administered between the start and end time for the case.

4. Table Descriptions

The **standardized data file version 2021** contains the following component tables that are linkable across one another.

Table Name	Description	Linking Phenotypes
Case Level	Main case table includes phenotypes related to patient and case characteristics, administrative data, anesthesia technique, comorbidities, fluid administration, intraoperative medications, outcomes, physiologic data, laboratory phenotypes (with dates/times) and staffing information. This table also includes institution-level data such as whether the medical center is affiliated with a medical school and bed size.	Patient ID; Case ID
CPT - Administrative Data	The current procedural terminology (CPT) code administrative data table contains all *case-linked* anesthesia and surgical CPT codes.This table also includes the primary anesthesia CPT code along with the base unit value associated with that primary code. In addition, this table includes results from the CPT prediction tool, along with the associated ranking for each of those predicted codes. More information regarding the CPT prediction tool can be found in the FAQ section of this document.	Patient ID; Case ID
ICD 9/10 - Administrative Data	The ICD 9/10 administrative data table contains all *patient-linked* ICD 9/10 codes from 365 days before to 365 days after the date of service along with case date and the admit and discharge dates associated with those codes. For more information on how to merge this table with the main case level table, please refer to the FAQ section in this document.	Patient ID; Case ID
ASPIRE Quality Measures	The quality measures table includes information about *case-linked* quality measures. Please note that not all cases meet the inclusion criteria for a given measure. Details regarding how each quality measure is defined can be found at the following link on the MPOG website (https://spec.mpog.org/Measures/Public) or in Appendix 2.	Case ID

Please refer to **Appendix 1** and **Appendix 2** for the full list of available phenotypes and measures.

5. Included Variables

Below is the list of variables included in the **standardized data file version 2021.** Full definitions and specifications for phenotypes and measures are available in **Appendix 1** and **Appendix 2**.

Data Table	Variable Name
CPT	MPOG Case ID
CPT	MPOG Patient ID
CPT	Anesthesia CPT (Primary)
CPT	Anesthesia CPT - Base Unit Value
CPT	Anesthesia CPT (All)
CPT	Predicted Anes CPT Code 1
CPT	Predicted Anes CPT Code 1 Score
CPT	Predicted Anes CPT Code 2
CPT	Predicted Anes CPT Code 2 Score
CPT	Predicted Anes CPT Code 3
CPT	Predicted Anes CPT Code 3 Score
CPT	Surgical CPT Codes
ICD 9/10	MPOG Case ID
ICD 9/10	MPOG Patient ID
ICD 9/10	ICD Code
ICD 9/10	Case Date (Date of Service)
ICD 9/10	Days from Case
ICD 9/10	Admit date associated with ICD 9/10 discharge diagnosis code
ICD 9/10	Discharge date associated with ICD 9/10 discharge diagnosis code
Case Level	MPOG Case ID
Case Level	MPOG Patient ID
Case Level	Date of service
Case Level	Holiday
Case Level	Weekend
Case Level	Admission Type
Case Level	Institution
Case Level	Medical School Affiliation
Case Level	Hospital Bed Size
Case Level	Age (Years)
Case Level	Race

Case Level	Sex
Case Level	Height (cm)
Case Level	Weight (kg)
Case Level	ASA Class
Case Level	Emergency Status (ASA Class) Yes/No
Case Level	Airway: Arrived Intubated
Case Level	Arterial Line Used
Case Level	BMI
Case Level	WHO BMI Classification
Case Level	BMI Classification (Pediatric)
Case Level	BMI Percentile (Pediatric)
Case Level	Body Region
Case Level	Ideal Body Weight
Case Level	Mortality (In Hospital 30-day)
Case Level	Date of death
Case Level	Last Known Alive
Case Level	Procedure Text
Case Level	Anesthesia CPT (Primary)
Case Level	Anesthesia CPT - Base Unit Value
Case Level	Anesthesia Technique: General
Case Level	Anesthesia Technique: Neuraxial
Case Level	Anesthesia Technique: Peripheral Nerve Block
Case Level	Anesthesia Technique: Sedation
Case Level	Obstetric Anesthesia Type
Case Level	Procedure Type: Adenotonsillectomy
Case Level	Procedure Type: Cardiac (new)
Case Level	Procedure Type: ECT
Case Level	Procedure Type: Endoscopy
Case Level	Procedure Type: Liver Transplant
Case Level	Procedure Type: Lung Transplant
Case Level	Procedure Type: MRI
Case Level	Procedure Type: Strabismus
Case Level	Procedure Type: TEE/Cardioversion
Case Level	Procedure Type: Tympanoplasty
Case Level	ProcedureType: IVF
Case Level	Antiemetics Given

Case Level	Paralytics Used (All)
Case Level	Paralytics Used (Non-depolarizing NMBs only)
Case Level	Nitrous Oxide Used
Case Level	Halogenated Anesthetic Gases (Yes / No)
Case Level	Propofol Infusion
Case Level	Oral Morphine Equivalent
Case Level	Oral Morphine Equivalent (Normalized)
Case Level	Non-Opioid Analgesics
Case Level	Blood Product Total - Cryoprecipitate
Case Level	Blood Product Total - FFP
Case Level	Blood Product Total - Platelets
Case Level	Blood Product Total - PRBCs
Case Level	Total Colloid Administered
Case Level	Total Crystalloid Administered
Case Level	Total Estimated Blood Loss (EBL)
Case Level	Total Urine Output
Case Level	MPOG Complication - Acute Kidney Injury (AKI)
Case Level	AHRQ Complication - Pulmonary - All
Case Level	Postoperative Destination
Case Level	Postop Troponin (Highest)
Case Level	Postop Tropnin (Highest) - Days After
Case Level	Anesthesia Start
Case Level	Anesthesia End
Case Level	Anesthesia Duration
Case Level	Case Start
Case Level	Case End
Case Level	Induction Start
Case Level	Induction End
Case Level	Patient In Room Date/Time
Case Level	Patient Out Of Room Date/Time
Case Level	Procedure Room Duration
Case Level	Surgery Start Date/Time
Case Level	Surgery End
Case Level	Waiting For Transport Duration
Case Level	Cardiopulmonary Bypass Start
Case Level	Cardiopulmonary Bypass End

Case Level	Cardiopulmonary Bypass Duration
Case Level	Primary Provider - Attending
Case Level	Primary Provider - Resident
Case Level	Primary Provider - CRNA
Case Level	Primary Provider - Fellow
Case Level	Duration of Anesthesiology Attending Sign-in
Case Level	Duration of CRNA and Anesthesia Assistant Sign-in
Case Level	Duration of Anesthesiology Resident Sign-in
Case Level	Minutes of MAP< 55
Case Level	Minutes of MAP< 65
Case Level	Median peak inspiratory pressure (PIP)
Case Level	PEEP Actual Median
Case Level	PEEP Set Median
Case Level	Tidal Volume Actual (Median)
Case Level	Tidal Volume Set (Median)
Case Level	Vent Respiratory Rate Actual (Median)
Case Level	Vent Respiratory Rate Set (Median)
Case Level	Preop Albumin
Case Level	Preop albumin days prior
Case Level	Preop Alk Phosphatase
Case Level	Preop Alk Phosphatase days prior
Case Level	Preop ALT
Case Level	Preop ALT days prior
Case Level	Preop Arterial Lactate
Case Level	Preop Arterial Lactate days prior
Case Level	Preop AST
Case Level	Preop AST days prior
Case Level	Preop BUN
Case Level	Preop BUN days prior
Case Level	Preop Calcium Ionized
Case Level	Preop Calcium Ionized days prior
Case Level	Preop Calcium Total
Case Level	Preop Calcium Total days prior
Case Level	Preop Chloride
Case Level	Preop Chloride days prior
Case Level	Preop carbon dioxide (CO2), arterial

Case Level	Preop carbon dioxide (CO2), arterial days prior
Case Level	Preop carbon dioxide (CO2), mixed venous
Case Level	Preop carbon dioxide (CO2), mixed venous days prior
Case Level	Preop carbon dioxide (CO2), serum
Case Level	Preop carbon dioxide (CO2), serum days prior
Case Level	Preop carbon dioxide (CO2), venous
Case Level	Preop carbon dioxide (CO2), venous days prior
Case Level	Preop Creatinine
Case Level	Preop Creatinine days prior
Case Level	Preop EGFR (Lowest within 60 Days)
Case Level	Preop Glucose
Case Level	Preop Glucose days prior
Case Level	Preop HCG
Case Level	Preop HCG days prior
Case Level	Preop Hematocrit
Case Level	Preop Hematocrit days prior
Case Level	Preop Hemoglobin
Case Level	Preop Hemoglobin days prior
Case Level	Preop HgbA1c
Case Level	Preop HgbA1c days prior
Case Level	Preop INR
Case Level	Preop INR days prior
Case Level	Preop Platelet Count
Case Level	Preop Platelet Count days prior
Case Level	Preop Potassium
Case Level	Preop Potassium days prior
Case Level	Preop Protein
Case Level	Preop Protein days prior
Case Level	Preop PT
Case Level	Preop PT days prior
Case Level	Preop PTT
Case Level	Preop PTT days prior
Case Level	Preop Sodium
Case Level	Preop Sodium days prior
Case Level	Preop Total Bilirubin
Case Level	Preop Total Bilirubin days prior

Case Level	Preop Troponin (Highest)
Case Level	Preop Troponin (Highest) days prior
Case Level	Preop Troponin (Most Recent)
Case Level	Preop Troponin (Most Recent) days prior
Case Level	Preop WBC
Case Level	Preop WBC days prior
Case Level	Elixhauser Comorbidity - AIDS \ HIV
Case Level	Elixhauser Comorbidity - Alcohol Abuse
Case Level	Elixhauser Comorbidity - Blood Loss Anemia
Case Level	Elixhauser Comorbidity - Cardiac Arrhythmias
Case Level	Elixhauser Comorbidity - Chronic Pulmonary Disease
Case Level	Elixhauser Comorbidity - Coagulopathy
Case Level	Elixhauser Comorbidity - Congestive Heart Failure
Case Level	Elixhauser Comorbidity - Deficiency Anemia
Case Level	Elixhauser Comorbidity - Depression
Case Level	Elixhauser Comorbidity - Diabetes (Complicated)
Case Level	Elixhauser Comorbidity - Diabetes (Uncomplicated)
Case Level	Elixhauser Comorbidity - Drug Abuse
Case Level	Elixhauser Comorbidity - Fluid/Electrolyte Disorders
Case Level	Elixhauser Comorbidity - Hypertension (Complicated)
Case Level	Elixhauser Comorbidity - Hypertension (Uncomplicated)
Case Level	Elixhauser Comorbidity - Hypothyroidism
Case Level	Elixhauser Comorbidity - Liver Disease
Case Level	Elixhauser Comorbidity - Lymphoma
Case Level	Elixhauser Comorbidity - Metastatic Cancer
Case Level	Elixhauser Comorbidity - Obesity
Case Level	Elixhauser Comorbidity - Other Neurological Disorders
Case Level	Elixhauser Comorbidity - Paralysis
Case Level	Elixhauser Comorbidity - Peptic Ulcer Disease, Excluding Bleeding
Case Level	Elixhauser Comorbidity - Peripheral Vascular Disorders
Case Level	Elixhauser Comorbidity - Psychoses
Case Level	Elixhauser Comorbidity - Pulmonary Circulation Disorders
Case Level	Elixhauser Comorbidity - Renal Failure
Case Level	Elixhauser Comorbidity - Rheumatoid Arthritis Collagen Vascular Diseases
Case Level	Elixhauser Comorbidity - Solid Tumor Without Metastasis
Case Level	Elixhauser Comorbidity - Valvular Disease

Case Level	Elixhauser Comorbidity - Weight Loss
Case Level	MPOG Comorbidity - Cerebrovascular Disease
Case Level	MPOG Comorbidity - Coronary Artery Disease
Quality Measures	MPOG Case ID
Quality Measures	Measure: ABX-01 (OB)
Quality Measures	Measure: AKI-01
Quality Measures	Measure: BP-01
Quality Measures	Measure: BP-02
Quality Measures	Measure: BP-03
Quality Measures	Measure: BP-04 (OB)
Quality Measures	Measure: BP-05
Quality Measures	Measure: CARD-02
Quality Measures	Measure: CARD-03
Quality Measures	Measure: FLUID-01-C
Quality Measures	Measure: FLUID-01-NC
Quality Measures	Measure: FLUID-02-C
Quality Measures	Measure: FLUID-02-NC
Quality Measures	Measure: GA-01 (OB)
Quality Measures	Measure: GA-02 (OB)
Quality Measures	Measure: GLU-01
Quality Measures	Measure: GLU-02
Quality Measures	Measure: GLU-03
Quality Measures	Measure: GLU-04
Quality Measures	Measure: GLU-05
Quality Measures	Measure: MED-01
Quality Measures	Measure: MORT-01
Quality Measures	Measure: NMB-01
Quality Measures	Measure: NMB-02
Quality Measures	Measure: NMB-03 (PEDS)
Quality Measures	Measure: PAIN-01 (PEDS)
Quality Measures	Measure: PAIN-02
Quality Measures	Measure: PONV-01
Quality Measures	Measure: PONV-02 (PEDS)
Quality Measures	Measure: PONV-03
Quality Measures	Measure: PONV-04 (PEDS)
Quality Measures	Measure: PONV-05

Quality Measures	Measure: PUL-01
Quality Measures	Measure: PUL-02
Quality Measures	Measure: PUL-03
Quality Measures	Measure: SUS-01
Quality Measures	Measure: SUS-02
Quality Measures	Measure: SUS-05 (PEDS)
Quality Measures	Measure: SUS-04
Quality Measures	Measure: TEMP-01
Quality Measures	Measure: TEMP-02
Quality Measures	Measure: TEMP-03
Quality Measures	Measure: TEMP-04 (PEDS)
Quality Measures	Measure: TEMP-05 (OB)
Quality Measures	Measure: TOC-01
Quality Measures	Measure: TOC-02
Quality Measures	Measure: TOC-03
Quality Measures	Measure: TRAN-01
Quality Measures	Measure: TRAN-02
Quality Measures	Measure: TRAN-03 (PEDS)
Quality Measures	Measure: TRAN-04 (PEDS)

6. Request Process

To obtain access to the standardized data file, researchers should follow the steps to "Write a Research Proposal" as outlined on the MPOG website. However, researchers should indicate that they are requesting to use the standardized data file instead of including a query spec for a customized data pull. To summarize, interested researchers should expect to participate in a research consultation with MPOG Central, then draft and submit their proposal (without a query spec) to mpog-research@med.umich.edu. Researchers will then present their proposal to the PCRC for approval, at which point they will be granted access to the standardized data file. Each research project requires separate IRB approval for a limited dataset at the institution responsible for conducting the analysis. Once PCRC and IRB approval are obtained, study team members will be granted access to the standardized data file. This file will reside on the MPOG, HIPAA-compliant virtual server, along with statistical and analytic software. As a reminder, case-level data can **never** be removed from the protected virtual server, however, summary outputs, such as tables, figures, etc., can be moved off the server.

7. Limitations

Although great care is taken at every stage of data collection/extraction and several validation steps are used before the data becomes part of the MPOG database, errors in the MPOG datasets may arise. These can come from issues with the source data, problems with merging multiple sources of data, and difficulties with concept mapping. Additional limitations stem from variations in the level of detail reported by each MPOG center, factors related to site selection and inclusion, types of procedures performed at each site, and so on. Any errors that exist in the larger MPOG dataset and other limitations of the full dataset are also limitations of the standardized data file. For a full description of all the steps the data go through to become part of the MPOG dataset and additional limitations, please see the manuscript Considerations for Integration of Perioperative Electronic Health Records Across Institutions for Research and Quality Improvement: The Approach Taken by the Multicenter Perioperative Outcomes Group (2020).

8. Contact Information

Please direct any questions or concerns regarding the MPOG standardized data to mpog-research@med.umich.edu.

9. Frequently Asked Questions

Q: How does the CPT prediction tool work?

A: The CPT prediction tool predicts the likely CPT codes for a case by using procedure text and a weighted scoring method. The top three CPTs predicted by the model are returned with the following exceptions:

- If the top CPTs include both codes for C-Section and labor epidural, return only those for C-Section.
- If the top scoring code is weighted 1.6 times the next highest scoring code, return only the first code.
- If the top scoring code is weighted 1.6 times the third highest scoring code, return only the first two codes.
- If the predicted codes are for OB cases and the patient's age makes that prediction unlikely (age less than 10 or greater than 55), those codes are not returned.

Q: ***How should a researcher merge the case-level table with the ICD 9/10 administrative data table?***

A: The ICD 9/10 administrative data table contains all patient-linked ICD 9/10 codes from 365 days before to 365 days after the date of service along with case date and the admit and discharge dates associated with those codes. Therefore, each researcher will need to decide per project, what relevant timeframe to look for associated ICD 9/10 codes. For example, if a researcher is trying to define a comorbidity using ICD 9/10 codes, then they may look for relevant codes 90 days prior to 7 days after the date of surgery (similar to how the Elixhauser comorbidity phenotypes are defined). In contrast, if a researcher is attempting to define an outcome based on ICD 9/10 codes, then they may only look for relevant codes occurring on or after the date of surgery.

Q: Can phenotype definitions change over time?

A: Yes, phenotypes are continuously refined and adapted as new institutions join MPOG with unique electronic health record systems. For this version of the standardized data file, we have taken a "snapshot" of the data and included the specification for how each phenotype was defined at the time that the data was queried in Appendix 1. Therefore, we do not recommend comparing data from multiple standardized data files, as the underlying definitions/logic may have changed. While the set of phenotypes included in the standardized data file remains fixed for each version release, if inconsistencies are found in the underlying logic for a phenotype or with an institution's mappings for that phenotype, MPOG will release update notes outlining the change(s) under the FAQ section of this document.

Q: How should a researcher utilize the physiologic parameters that have both a set and actual value (for example: median positive end-expiratory pressure (PEEP) set and actual, and median tidal volume set and actual)?

A: Each research team will need to determine the most appropriate way to utilize these covariates in their analysis. In some instances, at the discretion of the research team, it may be useful to combine the actual and set parameters to have more complete data.