MPOG
MULTICENTER PERIOPERATIVE
OUTCOMES GROUP

Import Manager Playbook

Introduction

This playbook will guide prospective institutions through a setup project for MPOG. It describes the overall process as well as providing step-by-step instructions for each phase.

What is MPOG/ASPIRE?

MPOG is a consortium of over 50 medical centers contributing electronic health record (EHR) and administrative data for the purposes of research and quality improvement.

MPOG QI, also known as the Anesthesiology Performance Improvement and Reporting Exchange **(ASPIRE)**, aims to improve the care of patients undergoing anesthesia by reducing unexplained variation in practice. Participating sites work together to build quality improvement measures, review best practices, and exchange ideas for improving patient outcomes.

How to Join?

The steps to join are outlined on the MPOG website. There are four main stages for joining as a contributing institution in MPOG. These stages are laid out in detail later in this playbook, but to summarize they are:

1. Laying the Groundwork
In the beginning phase of the project, the main focus is on getting organized by reviewing requirements and identifying relevant personnel. Furthermore, a number of regulatory documents need to be completed. Once committed to the project, servers are purchased.

2. Developing the file extracts
While waiting on server acquisition, begin development of extracts that pull anesthesia data from the source system.

3. Setting up the MPOG Infrastructure
Once the servers are ready, the MPOG components are installed and tested. This stage culminates in the upload of data to the central repository.

4. Ongoing Maintenance
With the setup complete, monthly tasks and troubleshooting protocols are reviewed.

Key Concepts

MPOG implementations use the MPOG Import Manager framework. The purpose of this framework is to enable hospitals to easily extract their anesthesia data for MPOG's research and quality improvement initiatives. From a single hospital database to a complex multi-instance conglomerate, MPOG Import Manager is designed to handle a wide range of possible configurations. Additionally, this framework attempts to automate as many processes as possible, such as handling updates to already extracted data and applying changes in variable mapping.

For these reasons, the Import Manager is somewhat complex and contains numerous components. In order to better acquaint you with this framework, the high-level concepts are described in the sections below.

Local vs Central Database

There is more than one copy of an institution's MPOG data. There is a local copy that is stored within an institution's network as well as being uploaded to MPOG Central. The local copy contains only that institution's data while the MPOG Central contains the data of all contributing institutions.

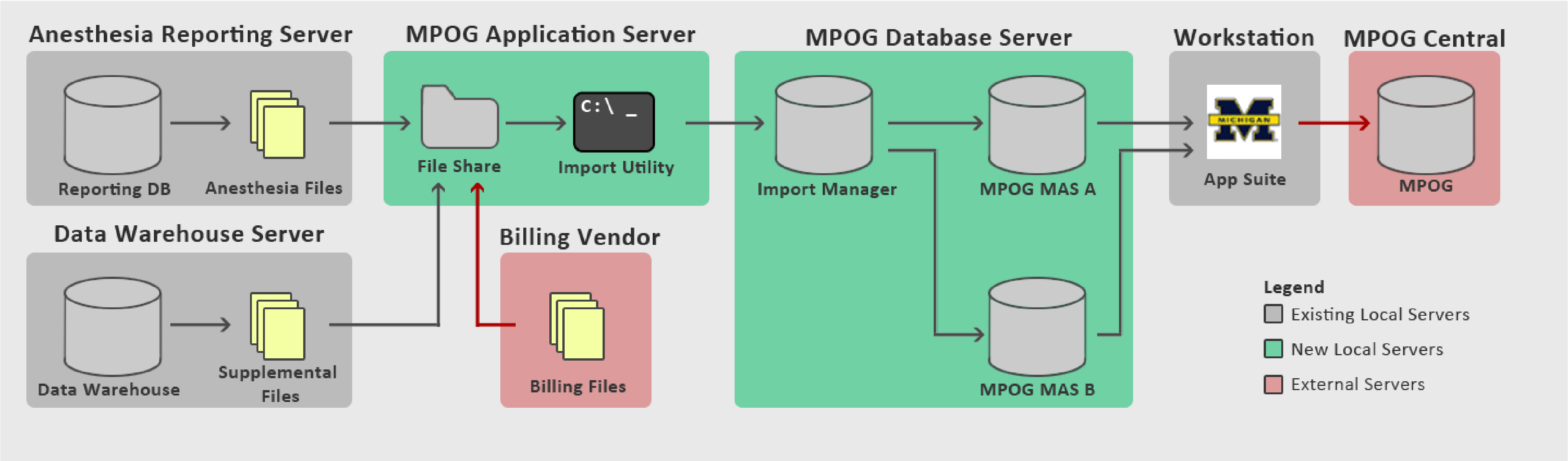
One important difference between these data sets is that the local copy contains PHI while the MPOG Central one does not. The upload process leaves out patient identifiers such as name, date of birth, and SSN. The primary reason PHI is kept locally is for scrubbing these identifiers out of text fields found throughout the anesthesia record.

File Pipeline

MPOG collects data from source systems (e.g. data warehouses, third-party billing vendor, lab interface, etc.) through the use of comma delimited text files. These files flow through a number of different systems and are transformed several times prior to ultimately being uploaded to MPOG Central. This process is generalized into the following five steps:

1. *Extract* – Files are generated by extracting data from its source system. These files are then placed into a file share accessible by the MPOG import utility.
2. *Import* – Files are removed from the file share and inserted directly into the Import Manager database.
3. *Consume* – File stored within the MPOG Import Manager database are parsed into tabular data and inserted into staging tables. Additionally, metadata regarding variable usage is generated for later mapping.
4. *Handoff* – The tabular data is inserted into the designated MPOG_MAS database.
5. *Upload* – Using the transfer utility within the MPOG application suite, surgical cases are uploaded to MPOG Central.

File Pipeline Diagram



Note that this diagram is only one example of many possible configurations. A number of factors may affect your institution's pipeline including:

- The number of instances of source anesthesia system
- The number of billing vendors
- The number of MPOG_MAS databases
- The number of user workstations with the application suite installed

Instances

An “instance” within the MPOG Import Manager framework broadly refers to a source anesthesia system. The framework supports multiple instances, whether they are multiples of the same type or a combination of current and legacy systems.

The main impact of having multiple instances on the file pipeline is that each instance from must have a separate directory. These directories are then assigned to an instance during setup.

Note: Given the possibility of identifier collision, data from different instances cannot be combined. As such, cases from different instances cannot be assigned to the same MPOG MAS database.

Organizations

Aside from instances, “organizations” are the primary method by which the framework splits apart cases. For multiple hospitals sharing the same instance, it is often desirable to separate their cases into different databases. This allows each institution to validate their own cases and prevents users from sister institutions examining their data.

Each surgical case is assigned an organization by the extract. All organizations detected by the framework can be assigned a destination MPOG_MAS database. Organizations can be assigned to the same database, different databases, or no database at all. An organization by default is assigned to no database and therefore its cases will not leave the MPOG_Import_Manager database.

Variable Mapping

Data elements are commonly stored in anesthesia systems with an assigned variable. These variables represent a wide variety of things such as blood pressures, medications, notes, staff roles, units of measure, and so on. Different anesthesia systems use different variables and even the same anesthesia system can have variables configured differently between hospitals.

In order to provide a standardized lexicon for all these different elements, MPOG provides a data dictionary called MPOG Concepts. Many of the variables used within your anesthesia system will be mapped to a MPOG Concept. This mapping helps the MPOG Import Manager framework to decide where a certain element should go (e.g. intraoperative note vs monitor recording). Furthermore, it helps queries to written for the central repository without knowing each institution’s specific variables.

Variable Mapping is performed primarily by the Clinical Reviewer using the provided mapping utility. For more information on variable mapping, refer to the Variable Mapping Guide and your MPOG Clinical Support.

Validation

In order to ensure the data being extracted is correct, there are two main methods of validation performed by the Clinical Reviewer. The Clinical Reviewer will be responsible for completing this validation each month.

Diagnostics is an application that displays macro-level views of data quality. It shows fill rates and mapping rates over time for many different classes of data. These high-level tests are useful for detecting any systemic issues with the extract and checking if there are any missing elements.

Case Validation is another application which allows the user to check individual cases and compare them to their source system. The application provides a checklist of questions to quickly guide through checking individual fields such as medications given and blood pressures recorded.

Stage 1: Laying the Groundwork

The regulatory and legal requirements are a critical step to MPOG implementation. Some of the approval processes can be challenging and can weeks to months to complete.

1-1. Apply for Membership

Implementation of MPOG requires a high level of technical expertise to create the technical infrastructure needed to submit data to MPOG. An institution must ensure that the department chair or head of practice is aware of the financial and FTE requirements of MPOG implementation and supports joining MPOG.

Once you have identified the personnel for this project, please fill out the relevant application below and return it to the MPOG Program Manager:

- MPOG Application: BCBSM Funded
- MPOG Application: non-BCBSM Funded

1-2. Complete a Business Associate Agreement (BAA)

A Business Associate Agreement (BAA) is a legal document that must be put in place between the Regents of the University of Michigan and your institution.

This is normally done through a grants/contracts office at each institution but may vary depending on the site. This agreement is put in place because during the technical implementation and training phases. MPOG developers and clinical staff may be exposed to protected health information (PHI) from your site. This document is put in place to allow MPOG staff to properly train staff.

You may start with University of Michigan's BAA template, but many sites wish to use their own.

This step MUST be completed prior to installing the MPOG infrastructure (Stage 3).

1-3. Complete a Data Use Agreement

Data use agreements (DUA) are drafted between the University of Michigan's and your institutional attorneys. This is normally done through a grants/contracts office at each institution but may vary depending on the site. Understand that these agreements are at the institutional level (not departmental or individual level) and will therefore require signatures from institutional representatives. The DUA must be in place before data submission to MPOG Central. Select a template (by location) below:

- Master DUA – United States (Michigan Sites)
- Master DUA – United States (non-Michigan Sites)
- Master DUA – Europe

1-4. Submit Performance IRB Application for Approval

There are two IRBs required for MPOG participation:

A centralized ‘umbrella’ IRB has been completed by the University of Michigan as the coordinating center. This IRB enables the collection of a limited clinical dataset (date of service is included) from the multiple institutions. This IRB does NOT need to be reproduced or established at each contributing center. As additional centers or data types are added to the MPOG effort, this centralized “umbrella” IRB will be updated with incremental addenda.

The second is an institutional IRB that must be completed by all sites interested in joining MPOG. Each institution (including the coordinating center) are required to receive a performance site IRB approval from their own IRB to send their institution’s limited clinical dataset to MPOG. The University of Michigan Performance Site Application Example can be used as a model for your institution-specific IRB.

If your site does not have a local IRB, then MPOG can oversee the IRB for your institution. If you have any questions about the IRB process or need IRB oversight, please contact mpog-admin@med.umich.edu for more information.

1-5. Review MPOG Bylaws and Terms of Membership Participation

You will need to review the MPOG Bylaws and agree to the terms of membership. Sign the agreement form and return to the MPOG Program Manager.

1-6. Review Data Requirements

Prior to submission, MPOG requires that a contributing institution must have at least 10,000 anesthetic cases. This generally corresponds to at least six to twelve months’ worth of cases. Furthermore, all data to be submitted must satisfy the minimum data requirements, which can be found here:

https://mpog.org/mindataelements/

Because of this requirement, institutions should not start on MPOG implementation until at least a few months after a major AIMS conversion/go-live. We recommend waiting until the system is stable, so the changes to the build are minimal. The implementation impact for an MPOG interface is considerable. We estimate that it will take at least six months to implement the project. Specific timelines might vary depending on the availability of your staff.

Institutions seeking to participate with ASPIRE have an additional requirement of submitting at least twelve months’ worth of data, regardless of case volume.

1-7. Acquire Servers

You need a local database server to store MPOG data and submit to MPOG Central. Additionally, you will need a modest application server to host some applications and services related to automation. Work with your IT department and your MPOG Database Administrator to purchase and configure a server that meets the requirements outlined below.

Database Server

- Physical or Virtual Machine
- CPU: 4+ cores (faster cores are recommended over more cores)
- RAM: 8+ GB minimum (32+ GB recommended)
- Storage: 500 GB is the recommended starting point (each surgical case is ~2 MB)
- Microsoft Windows Server 2012 R2 or newer
- Microsoft SQL Server 2016 or newer
    - Server Collation: SQL_Latin1_General_CP1_CI_AS (non-Case Sensitive)
- Microsoft .Net Framework 4.5 or later

Application Server

- Physical or Virtual Machine
- CPU: 2 cores minimum
- RAM: 4-8 GB
- Storage: 50 GB
- Microsoft Windows Server 2012 R2 or newer
- Microsoft .Net Framework 4.5 or later

1-8. Find Sources of Supplemental Data

Professional Fee Billing Codes

Anesthesia professional fee billing codes are sometimes found in the AIMS. However, they are often handled by a third-party billing vendor. If your institution is comprised of multiple hospitals or anesthesia groups, you may have more than one vendor.

It's important to determine the source of these billing codes quickly. If data is pulled from a vendor, they will need time to develop an extract to MPOG's file specifications.

Hospital Discharge Billing Codes and In-Hospital Dates of Death

Hospital discharge billing codes and in-hospital dates of death are required.

Again, it's important to identify the source of this data quickly to determine if any modifications to the provided queries are necessary.

1-9. Request an Application Account

In order for the Import Utility to be run automatically, it will need an application account for it to run under. Work with your Active Directory support team to create this account. Given this can take some time to process this request, it is recommended doing this early on in the project.

Stage 2: Develop the File Extracts

Before data can be imported into the MPOG framework, first it must be dumped into specifically formatted comma-delimited files. Unfortunately, given the large number of healthcare documentation systems MPOG cannot provide or develop an extract for every hospital. As such, an organization wishing to participate with MPOG must develop their own extract to generate the data files. This section provides a high level overview of this development.

2-1. Review File Specification

In order for Import Manager to correctly process data files, the files must be structured correctly. These rules include how the files must be named, which columns are in each file, and how each column must be formatted. The details on how to structure the data files can be found in a separate document, the Import Manager File Specification.

Main Anesthesia Files

The main anesthesia files primarily contain documentation that was recorded by an anesthesiologist or that was relevant to the anesthesiologist's workflow. Whenever main anesthesia files are mentioned, the following modules are included:

- Patients
- Cases
- Labs
- StaffTracking
- PeriopObservations
- PeriopObservationDetails
- PeriopAdministrations

Supplemental Files

Supplemental files are called as such because they contain data typically not found within a dedicated anesthesia system. It is not uncommon to obtain this data from a data warehouse or third party biller. When supplemental files are mentioned, the following modules are included:

- HospitalMortality
- Procedures
- ProcedureModifiers
- Diagnoses
- Payers

2-2. Develop Extracts / File Checker Testing

There are many ways to go about extracting data into files. Generally, this requires two problems to be solved. First is querying the data from various sources and transforming to fit the MPOG specification. This is most often accomplished through the use of a database query language such as SQL. Second is writing these data sets to a file in an automated fashion. How this is done is much more varied, as there are many tools and programming languages that can read from a database and write to a file. Common examples are Python, SSIS, and some variants of SQL such as T-SQL.

Which approach to use in solving these two problems is dependent on a number of factors such as database type, developer skillset, and institutional policy. Your MPOG Technical Support can offer advice regarding your organization's specific needs.

File Checker is an application that tests your extract against MPOG Import Manager File Specifications. Contact support@mpog.zendesk.com to get the most current version. Testing your extract with File Checker can be done immediately after submitting your application (no legal documents required). Additionally, File Checker can run on any workstation and does not require server purchase/setup.

2-3. Setup File Transfer

Typically, when files are generated they are not placed directly into the file share accessible by the MPOG application server. Instead, they are written to a server local to where the extract is running. This server may even be on a different network. Therefore, it is common to setup a process which moves these files from where they were initially placed to where they can be processed by the MPOG application server.

Most organizations utilize FTP or SFTP for this transfer. Consult your local IT team as this is a common task and a workflow for creating this process may already exist.

2-4. Automate Extract Execution

During the early stages of the setup phase the extracts will be run manually. However, the extract will need to be automated to pull in a year's worth of cases as well as to accommodate the daily maintenance schedule of pulling in new and updated data.

As with the extracts themselves, there are a large number of ways to automate them. Two common ways are through either SQL Server's job agent or Windows' Scheduled Tasks.

Stage 3: Setting up the MPOG Infrastructure

Once the MPOG Database Server and MPOG Application Server are ready, you can begin the setup of the MPOG infrastructure (refer to **Stage 1: Laying the Groundwork**). These steps will primarily be carried out by the Local Technical Support, unless otherwise specified.

3-1. Request Installation Package

Request an installation package from your MPOG Technical Support once you have completed File Checker Testing (2-2).

3-2. Enable CLR Execution

Run the following SQL on the MPOG SQL server to enable the execution of "SAFE" CLR assemblies. These assemblies will be installed later and are chiefly used for the efficient processing of text files.

```
--Note: Running this script requires sysadmin privileges.

EXEC sp_configure 'show advanced options', 1;
GO
RECONFIGURE;
GO
EXEC sp_configure 'clr strict security', 0;
GO
RECONFIGURE;
GO
sp_configure 'clr enabled', 1;
GO
RECONFIGURE;
GO
```

3-3. Create Blank Databases

MPOG_Import_Manager **AND** MPOG_MAS

If your organization has multiple hospitals and plans to separate the data, create additional MPOG_MAS databases (ex: MPOG_MAS_ANNARBOR and MPOG_MAS_DETROIT)

For the above databases, we recommend the following configuration:

- Arrange the database files according to your institution’s policies
- Set recovery mode to “Simple”
- Weekly full backups to another server. Nightly differentials are also recommended.

3-4. Run Installation Scripts

Ask your MPOG technical contact for the most up-to-date installation scripts. These scripts will be grouped by database, MPOG_Import_Manager and MPOG_MAS. Each script will be prefixed with a number

Run the scripts for the MPOG_Import_Manager database in sequential order. If an error is returned, stop and ask your MPOG technical contact for assistance.

Do the same for the MPOG_MAS scripts, except these you will against each MPOG_MAS_ database you created.

3-5. Insert an Institution Definition Row

Each MPOG_MAS database has its own unique identifier. Tell your MPOG technical contact your institution names and they will provide you with the appropriate INSERT statements.

```
--Note: This is an example only.
USE MPOG_MAS_Fake
GO
INSERT INTO dbo.MPOG_Institutions
VALUES (123.456, 'Fake Hospital Name', FHN', '2017-01-01')
GO
```

3-6. Setup File Import Utility

The installation package provided by MPOG will contain the Import Utility archive. Make sure both the MpogFlatFileImporter .exe and .config files are extracted and place them in a directory (“C:\Program Files\MPOG\” is recommended).

In the config file, update the server address in the connections strings section (denoted by "SERVERADDRESSHERE") to the address of the database server.

Also, note that the dateFormat setting should match the "Target Date" first column in the multi-date files. This setting is not used for dates in other columns in multi-date files and note at all for single date files. You can find additional details on the string formats at https://msdn.microsoft.com/en-us/library/8kb3ddd4(v=vs.110).aspx.

3-7. Create Extract Folder(s)

The Import Utility will read files from one or more folders, insert them into the MPOG_Import_Manager database, then delete the files from the folder. Each folder will correspond to a single extract instance (see the “Instances” section).

Typically, these directories are located on the application server on a non-system drive (e.g. “D:\MPOG_Extracts\”). However, they can be created elsewhere. The main requirement is that the Windows account(s) running the Import Utility have read/write access to that location.

3-8. Configure Extract Instance(s)

Here you will configure the file directory for each extract instance. Each instance will have its own ID, name, and file path. Most installations only require a single instance. For each instance, modify the SQL below and run it against MPOG_Import_Manager.

```
INSERT INTO Config.Instance_File_Paths
(
     Instance_ID,
     Instance_Name,
     File_Path
)
VALUES
 (
     0,
     '<INSTANCE NAME>',
     '<FULL FILE PATH HERE>'
)
```

Instance_ID – This integer is the main way the instance is referenced throughout the MPOG_Import_Manager database. This ID is manufactured and doesn’t correspond to anything outside the database.

Instance_Name – This name is used to differentiate the instances to developers.

File_Path – This path is the location of the folder that will contain this instances files once extracted. Note this location is in relation to the Import Utility, not the database server.

3-9. Configure User Database Access

The application suite relies on permissions set on the database to determine which applications the user can use. This access is controlled through pre-defined database roles, which are detailed in the MPOG Database Roles document. These roles can be granted to either individual logins or to active directory groups. The following access settings are recommended:

- Clinical Reviewer & Clinical Champion
    - MPOG_VariableMapper
    - MPOG_Exporter
    - MPOG_Researcher

    - MPOG_CaseValidator
    - MPOG_ContentDownloader
- Local Technical Support
    - db_owner on all MPOG databases
- MPOG Technical Support (optional)
    - db_owner on all MPOG databases
- Local MPOG Database Administrator
    - N/A (assumed to have sysadmin server permission)

3-10. Install Application Suite on User Workstation(s)

The application suite contains various utilities for use with the MPOG databases. It is installed locally to the Windows user profile and usually can be installed directly by the user. The setup executable will automatically install the latest available version.

However, some institution's desktop environment prevents this type of installation. If this is the case, work with your workstation IT and MPOG Technical Support to create a custom application package.

3-11. Extract Files

For the first extract, pull only a single day's worth of data. This will be sufficient to test the rest of the file pipeline, making sure there are no issues prior to pulling more files. Also, pulling smaller amounts of data means a smaller cycle time for applying fixes and re-extracting. The typical extract progression is as follows:

1. One Day
2. One Week
3. One Month
4. All data

3-12. Move Files

Once the files have been extracted, move them to the extract folder created in step 3-7.

During the first few tests of the pipeline, create a backup copy of the files to a subfolder. In the event something goes wrong and the files are accidently lost or corrupted, you won't have to wait to re-extract the files.

3-13. Run Import Utility

Run the Import Utility, either by double-clicking on the EXE or by running it in the command line with no arguments. You will see each filename listed as it is processed by the utility. The files will also be deleted from the folder once it is successfully imported.

You can check if the files were imported into the database by running the following queries.

```
--These tables also have a "Data" column that contains the text of the file
--It is omitted for performance
SELECT
     Instance_ID,
     Imported_File_Name,
     Imported_Time
FROM
     Import.Files

SELECT
     Instance_ID,
     Imported_File_Name,
     Inserted_Time,
     Completed_Time
FROM
     Import.PartialFiles
```

If the Import Utility exits unexpectedly or files remain in the extract folder once it completes, contact your MPOG technical support for assistance.

3-14. Consume Files

The file data is now ready for parsing. Run the following script to parse the files into their respective staging tables.

```
EXEC MPOG_Import_Manager.Core.ConsumeFiles
```

This will take several minutes to a few hours, depending on the amount of data being consumed. You can check on its progress with the following query.

```
SELECT
     *
FROM
     Core.Log_Consume
ORDER BY
     Processing_Start DESC
```

You can also check the staging tables in MPOG_Import_Manager to make sure data is being parsed correctly.

```
SELECT COUNT(*) FROM Staging.Patients_V1
SELECT COUNT(*) FROM Staging.Cases_V1
SELECT COUNT(*) FROM Staging.PeriopAdministrations_V1
SELECT COUNT(*) FROM Staging.PeriopObservations_V1
SELECT COUNT(*) FROM Staging.PeriopObservationDetails_V1
SELECT COUNT(*) FROM Staging.StaffTracking_V1
SELECT COUNT(*) FROM Staging.Labs_V1
```

3-15. Configure Organization’s Destination Database

Each organization detected by the infrastructure can be split into the different MPOG_MAS (see the “Organizations” section for more information). Now that at least one Cases file has been imported and consumed, organization metadata is available. Check the Config.Organizations table to see which organizations have been imported.

```
SELECT * FROM Config.Organizations
```

By default, the Destintation_Database and MPOG_Institution_ID columns are left NULL. This means that no organization’s data leaves the MPOG_Import_Manager without being explicitly configured to.

Organizations can be configured to export to a specific MPOG_MAS. You can modify the following SQL to update the organizations based upon their name.

```
UPDATE
     MPOG_Import_Manager.Config.Organizations
SET
     Destination_Database = 'MPOG_MAS_Fake',
     MPOG_Institution_ID = 123.456
WHERE
     Organization_Name = '<CONDITION>'
```

Note that not all organizations need to be configured. In fact, it is often desirable as non-participating organization’s data can be filtered out from being exported to a MPOG_MAS.

3-16. Configure user access for mappings

Before the Clinical Reviewer can use the variable mapping utility, they will need to be granted the appropriate permissions. In addition to the permissions set in step 3-9, they will also need to be granted access to specific organizations.

Variable mapping can be partitioned by organization, with each user only able to modify mappings relevant to their organization. However, it is most common for a single clinical reviewer to be in charge of all mappings. In this case, the following script will grant them access to all organizations.

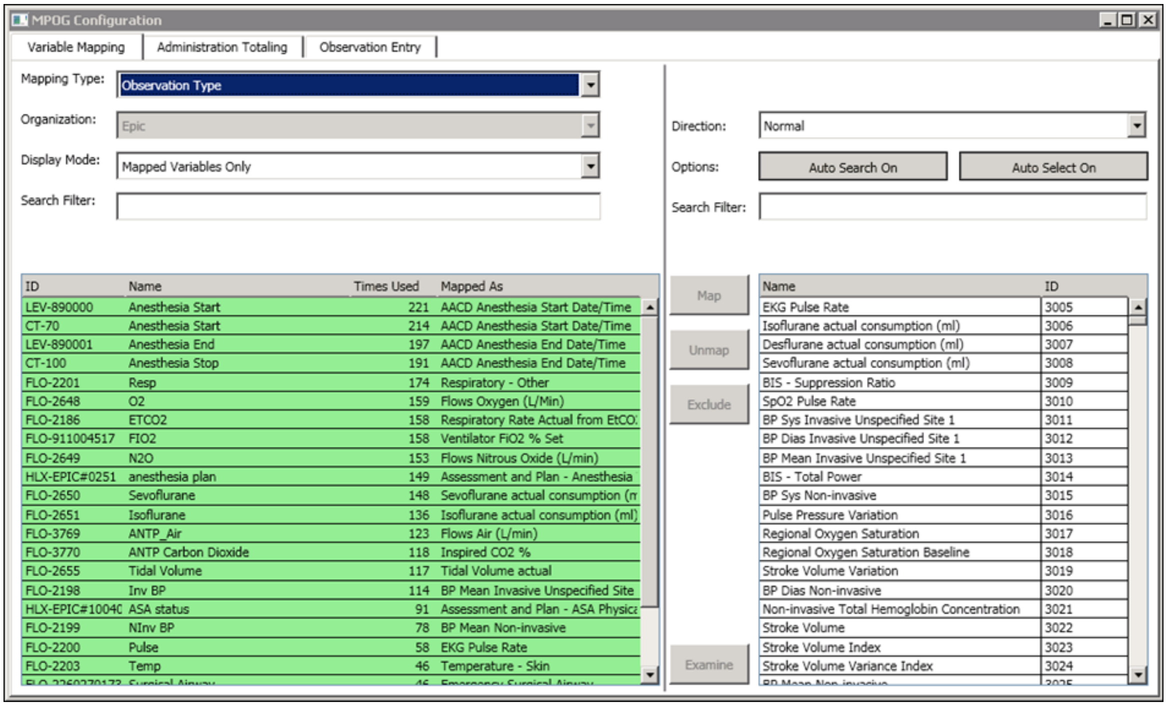
```
DECLARE @username VARCHAR(100)

--Modify this to the user's name (typically includes the domain)
SET @username = '<DATABASE_USERNAME>'

INSERT       INTO Config.User_Access
             (
               Organization_ID,
               User_Principle
             )
             SELECT DISTINCT
                    Organization_ID,
                    @username
             FROM
                    Config.Organizations o
                    LEFT JOIN config.User_Access ua
                    ON ua.Organization_ID = o.Organization_ID AND
                    ua.User_Principle = @username
             WHERE
                    ua.User_Principle IS NULL
```

3-17. Map variables to MPOG Concepts

The clinical reviewer can now map variables detected in the files to MPOG Concepts. They can refer to the Variable Mapping guide for more details.



Mapping Type: Observation Type

Organization: Epic

Display Mode: Mapped Variables Only

Search Filter:

Direction: Normal

Options: Auto Search On · Auto Select On

Search Filter:

ID	Name	Times Used	Mapped As
LEV-890000	Anesthesia Start	221	AACD Anesthesia Start Date/Time
CT-70	Anesthesia Start	214	AACD Anesthesia Start Date/Time
LEV-890001	Anesthesia End	197	AACD Anesthesia End Date/Time
CT-100	Anesthesia Stop	191	AACD Anesthesia End Date/Time
FLO-2201	Resp	174	Respiratory - Other
FLO-2648	O2	159	Flows Oxygen (L/Min)
FLO-2186	ETCO2	158	Respiratory Rate Actual from EtCO:
FLO-911004517	FIO2	158	Ventilator FiO2 % Set
FLO-2649	N2O	153	Flows Nitrous Oxide (L/min)
HLX-EPIC#0251	anesthesia plan	149	Assessment and Plan - Anesthesia
FLO-2650	Sevoflurane	148	Sevoflurane actual consumption (m
FLO-2651	Isoflurane	136	Isoflurane actual consumption (ml)
FLO-3769	ANTP_Air	123	Flows Air (L/min)
FLO-3770	ANTP Carbon Dioxide	118	Inspired CO2 %
FLO-2655	Tidal Volume	117	Tidal Volume actual
FLO-2198	Inv BP	114	BP Mean Invasive Unspecified Site
HLX-EPIC#1004C	ASA status	91	Assessment and Plan - ASA Physica
FLO-2199	NInv BP	78	BP Mean Non-invasive
FLO-2200	Pulse	58	EKG Pulse Rate
FLO-2203	Temp	46	Temperature - Skin
FLO-2260270173	Surgical Airway	46	Emergency Surgical Airway

Name	ID
EKG Pulse Rate	3005
Isoflurane actual consumption (ml)	3006
Desflurane actual consumption (ml)	3007
Sevoflurane actual consumption (ml)	3008
BIS - Suppression Ratio	3009
SpO2 Pulse Rate	3010
BP Sys Invasive Unspecified Site 1	3011
BP Dias Invasive Unspecified Site 1	3012
BP Mean Invasive Unspecified Site 1	3013
BIS - Total Power	3014
BP Sys Non-invasive	3015
Pulse Pressure Variation	3016
Regional Oxygen Saturation	3017
Regional Oxygen Saturation Baseline	3018
Stroke Volume Variation	3019
BP Dias Non-invasive	3020
Non-invasive Total Hemoglobin Concentration	3021
Stroke Volume	3022
Stroke Volume Index	3023
Stroke Volume Variance Index	3024
BP Mean Non-invasive	3025

Screenshot of the Data Diagnostics utility

3-18. Run Handoff to MPOG_MAS databases

Data is now ready to be exported from the MPOG_Import_Manager to the appropriate MPOG_MAS. This process is called “Handoff” and can be initiated by running the following two stored procedures.

```
--Determines which modules and target dates to run
EXEC MPOG_Import_Manager.Handoff.ScheduleItemsOntoQueue

--Processes items on the queue
EXEC MPOG_Import_Manager.Handoff.ProcessQueue
```

Again, this process will take anywhere from a few minutes to several days, depending on the amount of data needing processing. While this process runs, the following query can be used to see which items are currently on the queue.

```
SELECT * FROM MPOG_Import_Manager.Core.Handoff_Queue ORDER BY Priority
```

In addition, the following query displays the handoff’s progress, which module is currently processing, and if any errors have been encountered.

```
SELECT * FROM MPOG_Import_Manager.Core.Log_Handoff ORDER BY Handoff_Start DESC
```

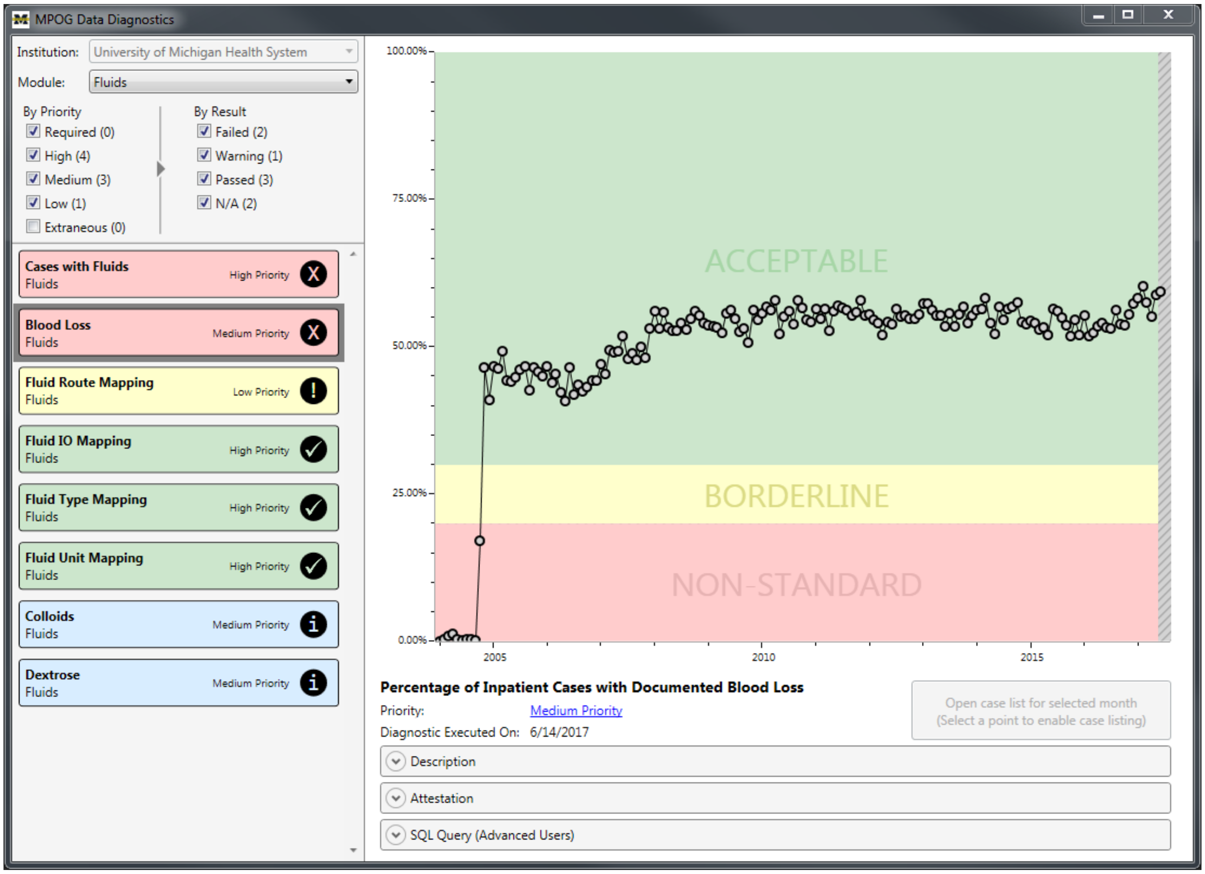
In the early stages of the project it is recommended to also verify data is showing up in the MPOG_MAS database(s).

```
USE MPOG_MAS_MyHospital --change this to your MPOG_MAS name
GO

SELECT COUNT(*) FROM AIMS_Patients
SELECT COUNT(*) FROM AIMS_IntraopCaseInfo
```

3-19. Run Diagnostics

Once handoff is complete, MPOG’s built-in diagnostics can be run to assess data quality. These diagnostics run various checks and cache the results. The clinical reviewer can then check these results in Data Diagnostics utility in the application suite.



Institution: University of Michigan Health System
Module: Fluids

By Priority
☑ Required (0)
☑ High (4)
☑ Medium (3)
☑ Low (1)
□ Extraneous (0)

By Result
☑ Failed (2)
☑ Warning (1)
☑ Passed (3)
☑ N/A (2)

Cases with Fluids Fluids	High Priority	X
Blood Loss Fluids	Medium Priority	X
Fluid Route Mapping Fluids	Low Priority	!
Fluid IO Mapping Fluids	High Priority	✓
Fluid Type Mapping Fluids	High Priority	✓
Fluid Unit Mapping Fluids	High Priority	✓
Colloids Fluids	Medium Priority	i
Dextrose Fluids	Medium Priority	i

Percentage of Inpatient Cases with Documented Blood Loss
Priority: Medium Priority
Diagnostic Executed On: 6/14/2017

Screenshot of the Data Diagnostics utility

You can run diagnostics with the following script.

```
--Run the following for each MPOG_MAS database
EXEC Eval.Diagnostics_RunAllDiagnostics
```

Running diagnostics typically takes 10-30 minutes, but can take longer if you have a significantly higher case volume.

3-20. Validate Data and Update Mappings

The clinical reviewer can now begin to examine and validate cases, using the Case Viewer, Data Diagnostics, and Case-by-Case Validation utilities. They can refer to the Validation Guide for more details.

As the clinical reviewer finds issues through their validation process, they may find variables that were missed in the first pass or variables that were mapped to the wrong concept. They can update these mappings using the variable mapping utility and the infrastructure will handle the necessary updates.

3-21. Give Application Account Necessary Permissions

The account the Import Utility will run as will need a login on the MPOG database server and a corresponding user account on the Import Manager database. Assign it the MPOG_ImportUtility database role to ensure it has the necessary permissions.

3-22. Setup Pipeline Automation

Now that the pipeline has successfully been tested, you can automate many of the processing steps. After these components are configured, files that appear in the extract folder will automatically be processed with little to no involvement from the Database Administrator.

SQL Agent Jobs

The database server's SQL Agent is used to schedule and run the following processes:

- Consuming files
- Scheduling the handoff queue
- Processing the handoff queue
- Running diagnostics

Work with your MPOG technical support to create these jobs and appropriate schedules for each.

> Note that modifying SQL Agent will require sysadmin access on the database server.

Scheduled Tasks

The Import Utility is automated using Windows Task Scheduler. Create a task called "MPOG – Run File Import Utility" that starts the utility. Schedule it to run every five minutes. Configure it to run using the credentials created in step 19.

3-23. Expand Extract Scope

Repeat steps 3-11 to 3-20, increasing the amount of data extracted as detailed in step 3-11 until a pull of all historical data has been completed.

3-24. Setup Regular Extracts

Now that the extracts have been tested, they can be automated. The setup varies based upon the originating system, so refer to the appropriate section below.

If pulling data from a third-party vendor, ongoing extracts are typically scheduled on a monthly basis. Work with your billing vendor representative to schedule these extracts and to setup an automated SFTP process for transferring the files.

3-25. Meet with MPOG for Review

Once the minimum requirement of data has been extracted and validated, meet with MPOG to perform an assessment of data quality. This meeting will include a MPOG clinical coordinator and your institution's clinical champion(s). These parties will identify any issues for uploading to the central repository.

If any outstanding issues are determined to be high priority, they will need to be resolved prior to continuing.

3-26. Upload to Test Repository for MPOG Director Review

The final sign-off of data quality is performed by MPOG leadership. To do this data must be uploaded to our test repository. Run the PHI scrubbing utility to prep cases for upload and run the transfer utility with the Database Selection option set to "developer".

Refer to the App Suite Guide for additional information.

3-27. Complete Outstanding Validation

If at this point there is any outstanding validation, the Clinical Reviewer will need to complete it prior to upload as a final check step.

3-28. Upload to MPOG Central

The Clinical Reviewer is now ready to upload to the production central repository. Run the PHI scrubbing utility to prep cases for upload. Run the transfer utility with the default settings to complete the upload.

Refer to the App Suite Guide for additional information.

Stage 4: Ongoing Maintenance

Once you leave the setup stage, the majority of the work has been completed and the processes automated. However, there are some ongoing, manual maintenance tasks to be aware of.

Clinical Reviewer Monthly Validation

The bulk of the ongoing effort is taken by the clinical reviewer. He or she is responsible for the continued validation of each month's data as well as upload. If your institution is a member of ASPIRE, the clinical reviewer will also be responsible for reviewing cases that may have failed ASPIRE measures.

Schema Updates

Twice a year, MPOG will release updates to its database schema. Once available, MPOG technical support will contact you with the installation instructions. These upgrades typically take 10-20 minutes to complete.

Server Maintenance and Light Troubleshooting

Your institutional IT is responsible for normal server maintenance, such as applying Windows updates and taking database backups.

Additionally, your support staff will handle issues that may arise. Refer to the MPOG Troubleshooting Guide for details for the appropriate contact for common issues.

Appendix A: Setup Phase Timeline

This table shows an overview of what steps to complete during your implementation and how long we estimate each step will take. **Do not skip step 1.** Many of the steps must be completed in order. For example, you can't complete step 21 without first completing steps 15 and 20. None of the steps can be completed without first contacting MPOG and applying for membership. If a step doesn't have dependencies, you can complete it at any time after completing step 1

Step	Task	Person	Estimated Time	Dependencies
1	Apply for Membership	Project Manager	4-6 weeks	(None)
2	Complete a Business Associate Agreement (BAA)	Project Manager	4-6 weeks	(1)
3	Complete a Data Use Agreement and Apply for Institutional Review Board (IRB) Approval	Project Manager	4-6 weeks	(1)
4	Agree to MPOG's Bylaws and Terms	Project Manager	4-6 weeks	(1)
5	Develop extract	Anesthesia Analyst, Billing Vendor	6-8 weeks	(1)
6	Contact billing vendor(s) and reporting team in preparation for the Set Up Supplemental Extracts task.	Project Manager	4 weeks	(1)
7	Extract 1-day	Anesthesia Analyst	1 week	(5, 6)

8	Test 1-day extract (including billing & mortality) with File Checker	Anesthesia Analyst, Local Technical Support	2-4 weeks	(7)
9	Acquire Servers	Project Manager	4-6 weeks	(8)
10	Prepare Your Data for MPOG Submission	Local Technical Support, Database Administrator	1 week	(9)
11	Configure User Database Access and Install the MPOG Application Suite on Workstations	Local Technical Support, Database Administrator	1 week	(10)
12	Perform a pipeline test with **1 day of data**	Anesthesia Analyst, Database Administrator	1 week	(10)
13	Perform a pipeline test with **1 week of data**	Anesthesia Analyst, Database Administrator	1 week	(12)
14	Perform a pipeline test with **1 month of data**	Anesthesia Analyst, Database Administrator	1 week	(13)
15	Automate database jobs (scripts provided)	Database Administrator	1 day	(14)
16	Allow Users to Access the Mapping Utility	Local Technical Support, Database Administrator	1 day	(14)
17	Map Variables to MPOG Concepts	Clinical Reviewer	2 weeks	(16)

18	Validate Data and Update Mappings	Clinical Reviewer	1 week	(17)
19	Test upload of **1 month of data**	Clinical Reviewer	1 week	(18)
20	Request and configure Service Account	Project Manager, Local Technical Support	2-4 weeks	(9)
21	Automate remaining database jobs (scripts provided)	Database Administrator	1 day	(15, 20)
22	Backfill 1 year of data	Anesthesia Analyst, Database Administrator, Clinical Reviewer	6 weeks	(21)
23	Setup Daily Extracts	Local Technical Support, Anesthesia Analyst, Billing Vendor	1 week	(21)
24	Meet with MPOG Leadership for Final Review	Clinical Reviewer	3 weeks	(19, 22)
25	Complete Outstanding Validation and resolve issues as needed	Clinical Reviewer	3 weeks	(24)
26	Scrub PHI and Upload Data to the MPOG Central Repository	Clinical Reviewer	1 day	(24, 25)

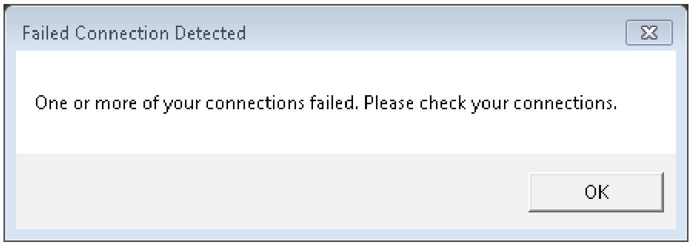
Appendix B: Troubleshooting Guide

This document lists common problems encountered with the MPOG infrastructure. Each problem includes the typical symptoms and steps than can be taken to resolve them.

If an issue cannot be resolved, the final step will list the most appropriate support contact to reach out to. If you are having an issue not listed below, please contact your MPOG Technical Support directly.

MPOG Suite General - Startup Connection Issue

Symptoms
The MPOG application suite has issues at startup connecting to the database, presenting the following dialog box:


Failed Connection Detected

One or more of your connections failed. Please check your connections.

Error screen associated with this error

Steps to Try (End User)

1. Click OK. This will bring you to the profile management screen.
2. Click “Edit Selected” to edit your current connection profile.
3. Verify the Server and Database fields are correct. You may need to check with your IT contact for the latest information.
   a. Server: ____
   b. Database: ____
   c. Note that Config and Research connections are unused and should be left blank.
4. Click OK. If no warning screen appears, the connection worked.
5. If a warning screen detailing the status of the different connection types appears, send a screenshot to your local technical contact.

Steps to Try (Technical Support)

1. If not already provided, ask the user for the error message returned by the suite. This will help identify the issue more quickly, such as:
   a. User has no login
   b. User has lacks permissions
   c. Timeout error
2. Verify the user’s database connection information is correct.

3. Verify the database server is available.
4. Verify the relevant MPOG_MAS database is available.
5. Verify the user has a login on the server.
6. Verify the user has the correct permissions on the database, at a minimum having the MPOG_Researcher role.
7. If still not resolved, reach out to MPOG support.

MPOG Suite - Crash Error

Symptoms
The MPOG suite stops working and presents a crash error report screen.

Steps to Try

1. Fill out the fields in the error report, detailing the steps leading up to the crash if possible.
2. Click “Send Error Report” and MPOG support staff will get back you regarding the error.
3. If for some reason the report fails to send, email your MPOG support contact directly.

Upload Utility - Uploading to Central Error

Symptoms
While uploading cases to the central MPOG repository, the upload utility presents an error stating “A serious error was encountered and the upload was aborted.”

Steps to Try

1. Check if internet access is available by opening a website (http://www.med.umich.edu/)
    a. If not, find internet access either by connecting to a wireless network or by contacting your IT department.
2. Wait a few minutes, restart the suite and try the upload again. Network issues can sometimes interrupt the upload.
3. If the issue persists, contact MPOG support.

Diagnostics – Results are Out of Date or Have Not Been Run

Symptoms
The diagnostics have not been run recently and more up-to-date results are needed. (Note the diagnostic last run time is listed underneath the diagnostic chart.

Steps to Try (Technical Support)

1. If diagnostics results need to be refreshed immediately, they can be executed by running the following SQL on each of your MPOG_MAS databases:
    a. EXEC Eval.Diagnostics_RunAllDiagnostics

2. Diagnostics should be run every night automatically. Check the MPOG diagnostic job in the SQL Agent for the following:
   a. Verify that SQL Agent is running.
   b. View the job history to determine if the job is failing or not being run at all.
   c. Verify that both the job and its schedule are enabled.
   d. Verify the job contains the SQL mentioned above.
3. If still not resolved, reach out to MPOG support.

Diagnostics / Case Validation – Missing or Incorrect Data

Symptoms

Data expected from the anesthesia record is not appearing in data diagnostics or case validation. The following are some examples of this issue:

- Diagnostics show lower fill rates than expected
- Case Validation lists "NOT FOUND" for a given question
- A common or expected data element is missing from the Case Viewer
- Case Validation question is incorrect i.e. answered "No"
- Data displayed within the Case Viewer is incorrect

Steps to Try (End User)

1. Verify data is in original anesthesia record. Sometimes data elements are genuinely missing from the original documentation or were documented incorrectly.
2. Check variable mapping, if applicable. Many MPOG applications rely on accurate variable mapping to identify different types of data. It's possible that one or more relevant variables have not been mapped or was mapped to the wrong concept.
   a. If changing variable mappings, be aware any changes will not be reflected until the next day.
3. If still unresolved, identify the scope of the issue. Does this affect all cases, cases within a particular time range, or just a single case?
4. Send the summary of the problem to your local technical contact. Please include any relevant information such as:
   a. Scope of the problem
   b. Diagnostic and/or Case Viewer screenshots
   c. Variable IDs and names
   d. Example MPOG Case IDs

Steps to Try (Technical Support)

1. Are there any awaiting files in the file directory?
   a. If so, run import utility and later investigate why import utility automation is failing (see section below).
   b. If running the import utility manually also fails and the first column of the file is a date, make sure the date format of the first column matches that of the import utility's config

file. If they don’t match, correct the dates in the file. You may need to reach out to the file extract developer for assistance.

2. Verify whether the data was imported.
    a. Check the Import.Files or Import.PartialFiles tables to make sure the files for the given date exist.
3. Verify the relevant rows within the file are correct.
    a. A file’s data can be manually parsed into tabular format using the Core.ParseFileData stored procedure.
    b. If the file is incorrect, contact the extract developer.
4. Verify whether the data was consumed.
    a. Check the Core.Log_Consume table for the relevant Target_Date and Module.
    b. Also check the relevant Staging table to see if the rows are present.
    c. Running the consume process can be manually done via the stored procedure Core.ConsumeFiles.
5. Verify whether the data was handed off.
    a. Check the Core.Log_Handoff table for the relevant Target_Date and Module.
    b. Running the handoff process can be manually done via the Handoff.ScheduleItemsOntoQueue and the Handoff.ProcessQueue stored procedures.
6. If still unresolved, contact MPOG for additional assistance

Import Utility – Not Running Automatically

Symptoms

Files remain within the MPOG directory for longer than five minutes after being placed there.

Steps to Try (Technical Support)

1. Verify that the Scheduled Task “MPOG – Run File Import Utility” located on the MPOG application server is enabled and scheduled for every five minutes.
2. Verify the Scheduled Task refers to the correct location for the Import Utility (C:\Program Files\MPOG\ MpogFlatFileImporter.exe)
3. Verify that the Windows account the Scheduled Task runs under has a login on the MPOG database server.
4. Verify that the Windows account the Scheduled Task runs under has a user account on the MPOG_Import_Manager database with the db_owner role.
5. If still unresolved, contact MPOG for additional assistance.