

# MPOG Research Process Overview

*From Real-World Data to Actionable Knowledge*

*Michael Mathis, MD*

*Assistant Professor of Anesthesiology*

*Associate Research Director, MPOG*

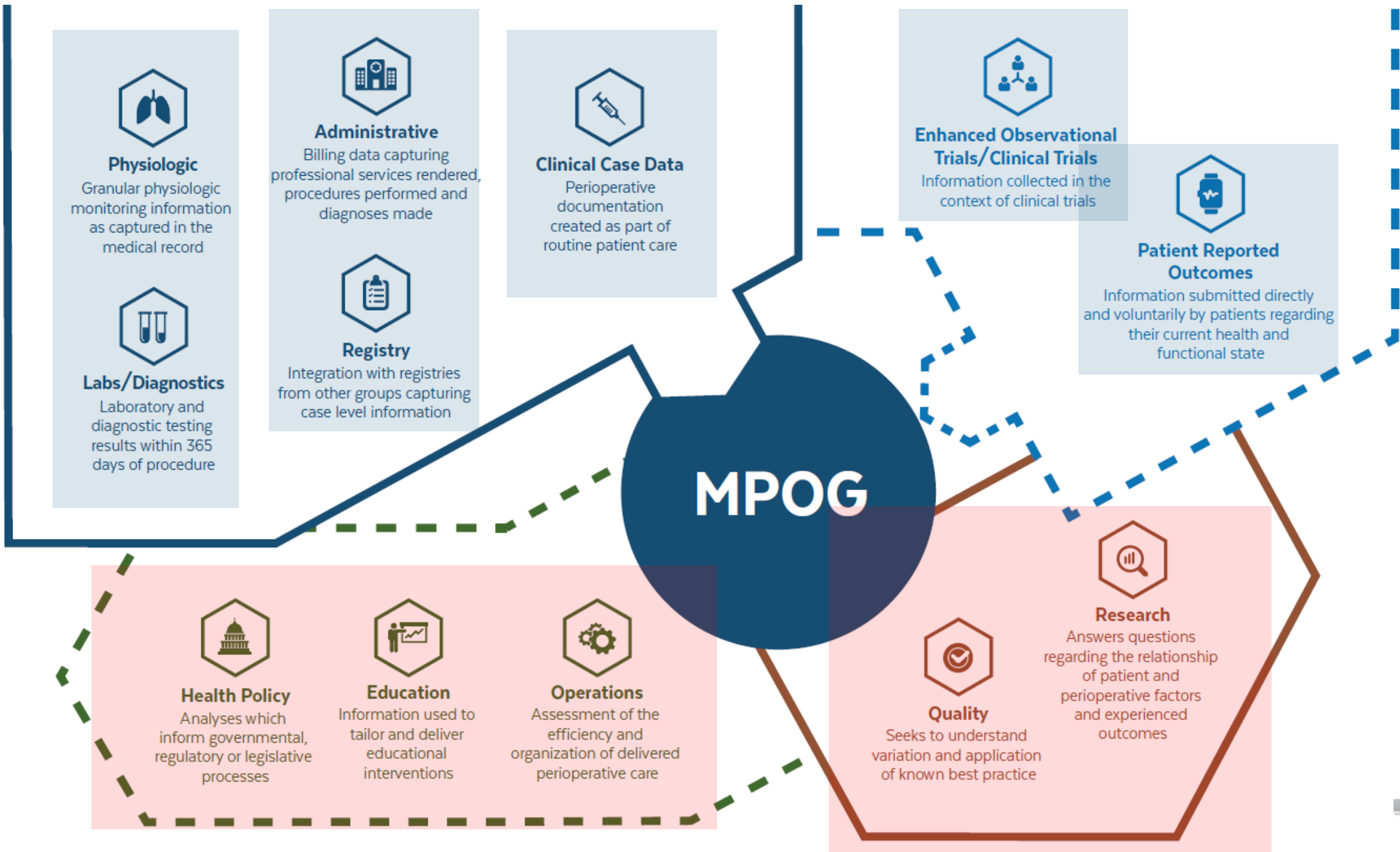
*Shelley Vaughn, MPH*

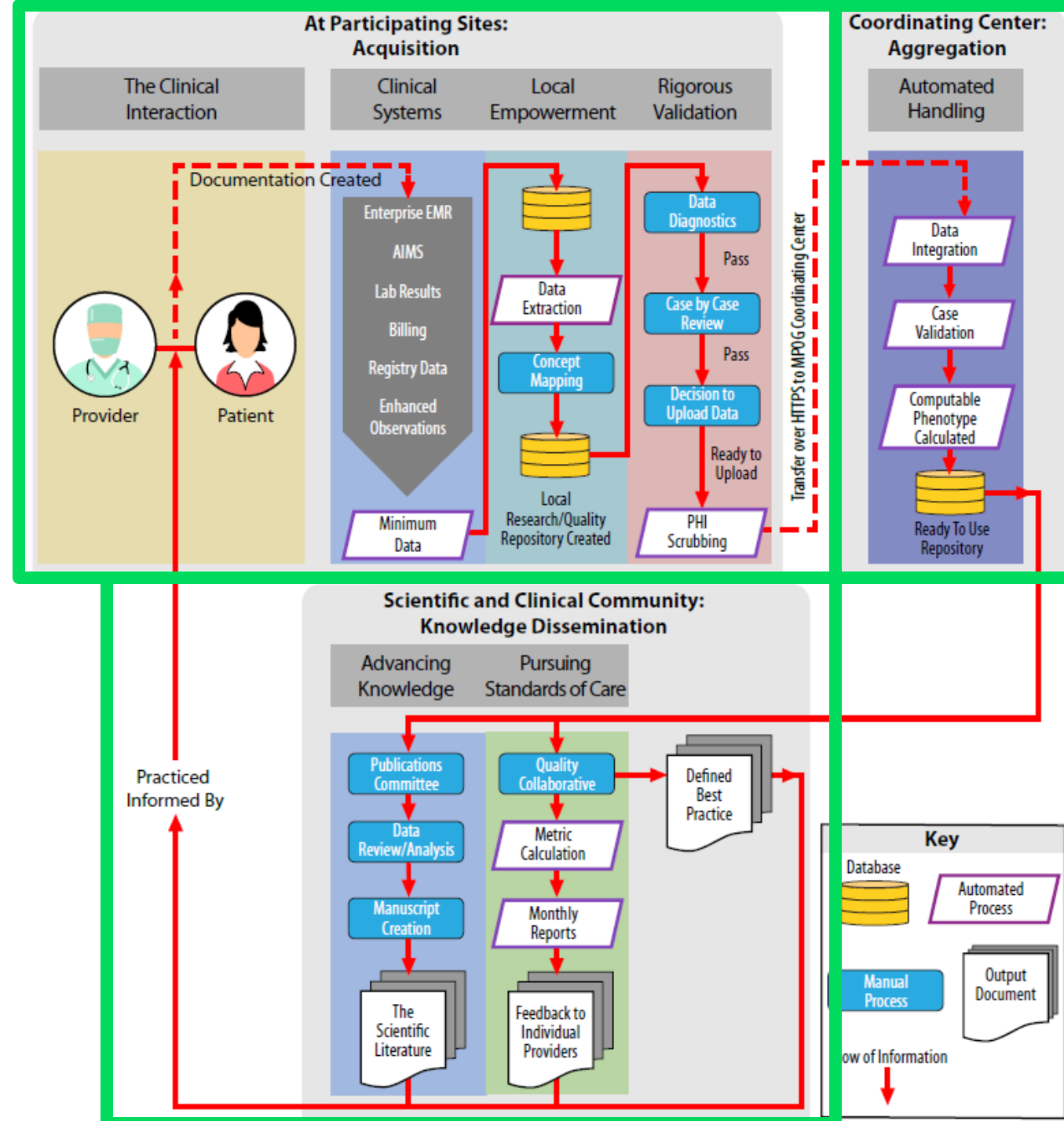
*Department of Anesthesiology*

*Lead Research Facilitator, MPOG*

# Outline

- MPOG Data Pipeline
- Types of MPOG Research
- Querying MPOG Data
- Writing a Research Proposal
- Inspecting/Curating MPOG Data
- Submitting a Manuscript





# Types of Research Studies Leveraging MPOG

- Descriptive Studies
- Operational Analyses
- Outcomes Studies
  - MPOG Data
  - MPOG + Surgical Registry



**The Society  
of Thoracic  
Surgeons**

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- Enhanced Observational Studies (EOS)
- Clinical Trials Network

## The Inauguration of the Clinical Trials Network / Initiative for Multicenter Perioperative Clinical Trials (IMPACT)

With support from leaders of multiple national anesthesiology organizations, including [AUA](#), [FAER](#), [IARS](#), [SOCCA](#) and [eSAS](#), the Initiative for Multicenter Perioperative Clinical Trials (IMPACT) was unveiled at the 2018 IARS conference. This exciting initiative was created to submit research proposals to top-tier funding agencies such as the [NIH](#) and [PCORI](#), and help investigators conduct approved trials. Similar initiatives have been previously implemented in Canada, Australia, and Europe, and now for the first time, in the U.S.

There were three proposals selected at the 2018 IARS meeting in May. Each proposal will receive \$15,000 in seed funds for grant preparation. MPOG will provide the multi-site infrastructure necessary for this collaborative approach to Anesthesiology clinical and translational research. For more information on the submission process see the [Call for Letters of Intent](#).

### Proposals



**Trial:** Optimized Opioid Management or Usual Treatment to Reduce Persistent Opioid Use Following Surgery (OPT-OUT)

**PI:** Dr. Michael Aziz, MD

**PI Site:** Oregon Health and Science University

[More Info](#)



**Trial:** Individualized Intraoperative Protective Ventilation using an Open Lung Approach with Driving Pressure Limitation

**PI:** Dr. Randal Blank, MD, PhD

**Institution:** University of Virginia School of Medicine

[More Info](#)



**Trial:** Intraoperative Normoxia versus Hyperoxia during Maintenance Anesthesia to Reduce Postoperative Complications

**PI:** Frederic T. (Josh) Billings, MD, MSCI

**PI Site:** Vanderbilt University Medical Center

[More Info](#)

# DataDirect: “Democratizing” data access

MPOG  
DataDirect

Step 1: Define Project

Step 2: Filter

Demographics

Cases

Comorbidities

Diagnoses

Procedures

Notes

Medications

Physiologic

Labs

Outcomes

Step 3: Choose Output

Step 4: Finalize

Email Support/Feedback

STS-MPOG Integrated Master Data - Cardiac LPV Study 2018-5-15.xlsx - Excel

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do... Mathis, Michael Share

Get External Data

New Query Recent Sources

Get & Transform

Connections Properties Edit Links

Connections

Sort Filter

Filter Clear Reapply Advanced

Flash Fill Remove Duplicates Text to Columns

Consolidate Relationships Manage Data Model

Data Tools

What-If Analysis Forecast Sheet

Forecast

Group Ungroup Subtotal

Outline

LS2

	D	E	F	G	LM	LN	LO	LP	LQ
1	Age	Sex_Reviewed	Race_Reviewed	Ethnicity_Reviewed	HospitalMortality30Day	OralMorphineEquivalent	Morphine_Total_Dose	Fentanyl_Total_Dose	Last_OR_Ventilation_Time
2	55	M	Caucasian	Non-Hispanic	No	375		1.25	200
3	30	F	Caucasian	Non-Hispanic	No	195	5	0.6	200
4	52	M	Caucasian	Non-Hispanic	No	261	2	0.85	200
5	57	M	Caucasian	Non-Hispanic	No	300		1	200
6	39	M	Unknown/Other	Non-Hispanic	No	225		0.75	200
7	56	M	Caucasian	Non-Hispanic	No	150		0.5	200
8	63	F	Caucasian	Non-Hispanic	No	450		1.5	200
9	53	M	Caucasian	Non-Hispanic	No	450		1.5	200
10	37	M	Caucasian	Non-Hispanic	No	300		1	200
11	63	M	Caucasian	Non-Hispanic	No	300		1	200
12	65	M	Caucasian	Non-Hispanic	Yes	240		0.8	200
13	52	M	Caucasian	Non-Hispanic	No	375		1.25	200
14	38	M	Unknown/Other	Non-Hispanic	No	450		1.5	200
15	60	F	Caucasian	Non-Hispanic	No	210		0.7	200
16	46	M	Caucasian	Non-Hispanic	No	300		1	200
17	60	M	Caucasian	Non-Hispanic	No	255		0.85	200
18	82	M	Caucasian	Non-Hispanic	No	165		0.55	200
19	76	M	Caucasian	Non-Hispanic	No	150		0.5	200
20	48	M	Caucasian	Non-Hispanic	No	375		1.25	200
21	76	F	Caucasian	Non-Hispanic	No	300		1	200
22	76	F	Caucasian	Non-Hispanic	No	225		0.75	200
23	73	M	Caucasian	Non-Hispanic	No	180		0.6	200
24	58	M	Caucasian	Non-Hispanic	No	450		1.5	200
25	69	M	Caucasian	Non-Hispanic	No	450		1.5	200
26	47	F	Caucasian	Non-Hispanic	No	600		2	200
27	61	M	Caucasian	Non-Hispanic	No	450		1.5	200
28	85	F	Caucasian	Non-Hispanic	No	300		1	200

*How many...*

*...adults...*

*...undergoing general anesthesia with an endotracheal tube...*

*...with heart failure, diabetes, or hypertension...*

*...received propofol during the surgery?*

# Phenotypes: *Structured Inferences* from messy data

## Standard MPOG Concepts

Fluids	Labs	Vitals
Meds	Times	Diagnoses
Outputs	Events	Outcomes

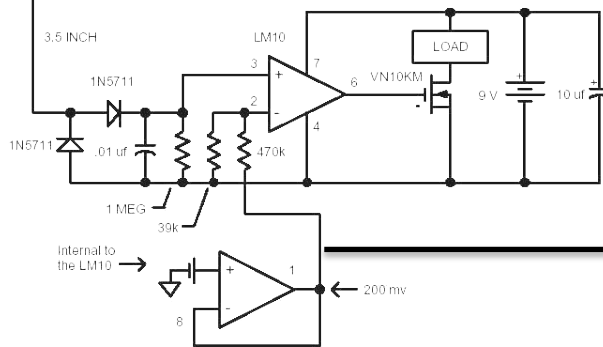
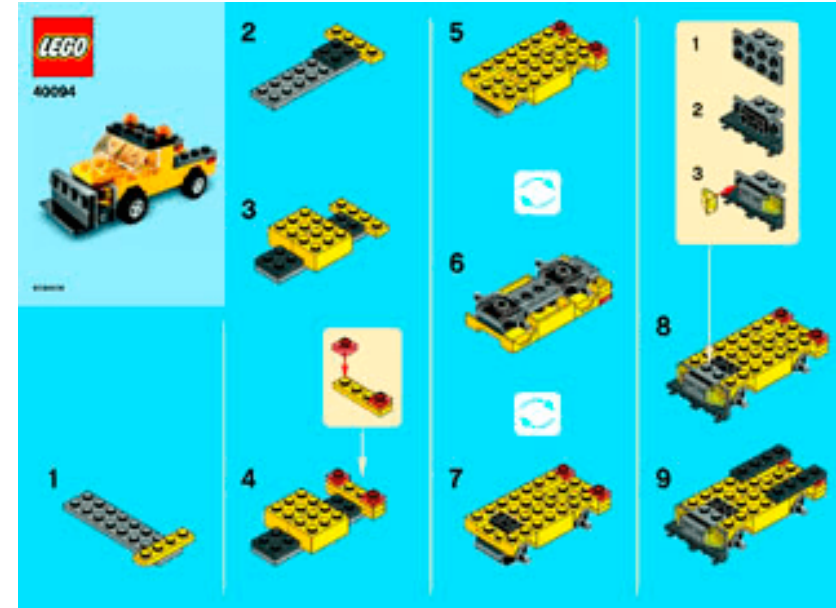


Figure 1: Cellular phone activity detector.



## MPOG Phenotypes

Cardiopulmonary Bypass Used  
Anesthesia Technique: General  
Oral Morphine Equivalents  
Baseline Blood Pressure

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# Developing a Research Study



## Perioperative Clinical Research Committee (PCRC)

The research committee coordinates the clinical research efforts of MPOG, by reviewing all submitted research proposals and tracking the progress of ongoing research projects. The committee ensures the appropriateness of the clinical research conducted within MPOG and the use of MPOG resources. Only colleagues from active MPOG sites can submit a research proposal to the PCRC for review and it is the responsibility of the MPOG site's Principal Investigator (PI) to review all proposals before submission to the PCRC.

The following steps outline the process for submitting a research proposal:

### STEP 1: BEFORE YOU BEGIN

### STEP 2: DETERMINE FEASIBILITY

### STEP 3: WRITE RESEARCH PROJECT SPECIFIC IRB AND DRAFT PCRC PROPOSAL

### STEP 4: DATA QUERY SPECIFICATION

<b>Title of Study or Project:</b>	Multicenter Review of Practice Patterns Regarding Benzodiazepine Use in Cardiac Surgery
<b>Primary Institution:</b>	University of Michigan
<b>Principal Investigator:</b>	Allison Janda, MD
<b>Co-Investigators:</b>	Allison Janda, MD; Jessica Spence, MD; Timur Dubovoy, MD; Emilie Belley-Côté, MD PhD; Graciela Mentz, PhD; Sachin Kheterpal, MD, MBA; Michael Mathis, MD
<b>Statisticians:</b>	Graciela Mentz, PhD
<b>Type of Study:</b>	<input checked="" type="checkbox"/> Retrospective Observational
<b>IRB Number and Status:</b>	HUM00167369 / approved
<b>Hypotheses/Aims:</b>	We propose to explore data from cardiac surgical patients meeting inclusion criteria, to describe benzodiazepine use during cardiac surgery across MPOG centers. We aim to identify patient factors associated with benzodiazepine use and further describe the timing of administration. We hypothesize that patient, provider, and institutional factors are independently associated with benzodiazepine use during cardiac surgery.
<b>Number of Patients/Participants:</b>	Based on the availability of pertinent perioperative data, we expect approximately 5,000 patients to be included at the University of Michigan, and 60,000 in MPOG.
<b>Power Analysis:</b>	Sample size for this descriptive study are based on the accuracy of the overall estimates of benzodiazepine administration. It was determined that if the true population level use of benzodiazepines ranges between 70% and 90%, we will need a sample between 1,536 to 3,585 patients to estimate descriptive statistics with a precision of 3%.
<b>Proposed statistical test/analysis:</b>	We will produce descriptive statistics including: histograms, mean/median, standard deviation/interquartile ranges, percentiles and Q-Q plots.
<b>Resources (Brief summary of resources for data collection, personnel, financial):</b>	Data collection will include MPOG database queries performed via IT support. Statistical analysis will be conducted by Anesthesiology Department staff in consultation with Graciela Mentz; and in discussion with all co-investigators. Financial support as per the University of Michigan Department of Anesthesiology, NIH-NIGMS, Grant T32GM103730-06; NIH-NHLBI, Grant 1K01HL141701-02, Bethesda, MD

# PCRC Community of Peers

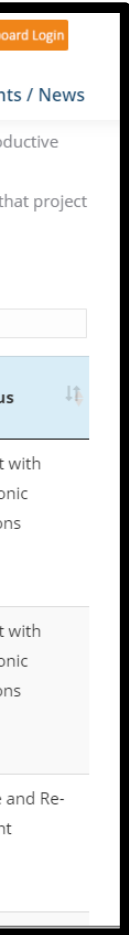
## STEP 8:

The PCRC  
a meeting to

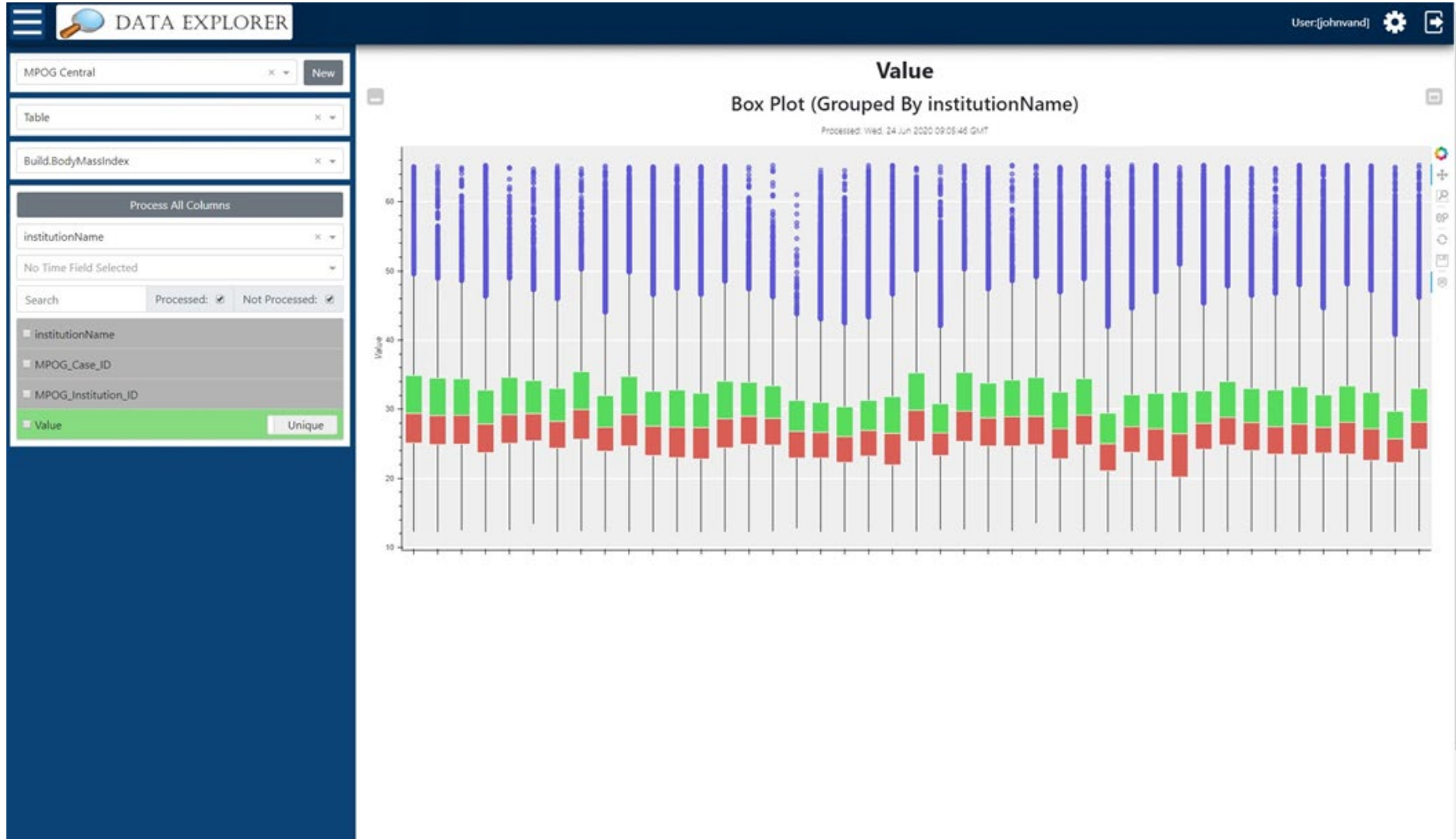
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screen), or



# Data Visualization and Curation



# Writing the Manuscript

## ANESTHESIOLOGY

### Succinylcholine and Dantrolene Available for Malignant Hypertension Treatment

Database Analyses and Systematic Review

Marilyn Green Larach, M.D., F.A.A.P., Thomas T. Klumpner, M.D., Barbara W. Bandom, M.D., Michelle T. Vaughn, M.D., Kumar G. Belani, M.B.B.S., M.S., F.A.A.P., Andrew Herlich, D.M.D., M.D., F.A.A.P., F.A.S.A., Tae W. Kim, M.D., M.E.H.P., Janine Limoncelli, M.D., Sheila Riaz, M.Sc., M.D., FRCPC, Erica L. Sivak, M.D., John Capacchione, M.D., Darlene Mashman, M.D., Sachin Kheterpal, M.D., M.B.A., on behalf of the Multicenter Perioperative Outcomes Group\*

ANESTHESIOLOGY 2019; 130:41–54

quality in action

Improving  
Measurements  
Monitoring

Patrick J.  
Meghana

## ANESTHESIOLOGY

### Sugammadex *versus* Neostigmine for Reversal of Neuromuscular Blockade and Postoperative Pulmonary Complications (STRONGER)

A Multicenter Matched Cohort Analysis

Sachin Kheterpal, M.D., M.B.A., Michelle T. Vaughn, M.P.H., Timur Z. Dubovoy, M.D., Nirav J. Shah, M.D., Lori D. Bash, Ph.D., M.P.H., Douglas A. Colquhoun, M.B.Ch.B., Amy M. Shanks, Ph.D., Michael R. Mathis, M.D., Roy G. Soto, M.D., Amit Bardia, M.D., Karsten Bartels, M.D., Ph.D., Patrick J. McCormick, M.D., M.Eng., Robert B. Schonberger, M.D., M.H.S., Leif Saager, M.D., M.M.M.

ANESTHESIOLOGY 2020; 132:1371–81

## ANESTHESIOLOGY

### Preoperative Risk and the Association between Hypotension and Postoperative Acute Kidney Injury

Michael R. Mathis, M.D., Bhiken I. Naik, M.B.B.Ch., Robert E. Freundlich, M.D., M.S., M.S.C.I., Amy M. Shanks, Ph.D., Michael Heung, M.D., Minjae Kim, M.D., Michael J. Burns, M.D., Ph.D.

### Overlapping Surgery and Postoperative Outcomes

PhD; Chris A. Rishel, MD, PhD; Michelle T. Vaughn, MPH; Dr Med, MMM; Lee A. Fleisher, MD; Edward J. Damrose, MD; PhD; for the Multicenter Perioperative Outcomes Group (MPOG)

# Writing the Manuscript

- Authorship protocol
  - Byline authors – as per [ICMJE guidelines](#)
  - Acknowledged collaborators – MPOG assists with tracking
- Registration of research protocol
  - Protected version on MPOG website → always
  - Public access version on [Open Science Framework](#) → discretion of PI
- [iThenticate](#) plagiarism checker

# Thank You

