

Using MIMIC/eICU I/O and Medication Data Workshop

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Agenda

- Clinical insights
 - What is I/O and medications? Why do we use them?
- Explanation of the tables (attributes)
- Tutorial using MIMIC/eICU tables
 - Summing up fluid input, output
 - Identifying duration of hemodialysis
 - Identifying whether patient had antibiotics during hospitalization
 - ...

What are I/O and Medications?

- I/O
 - Input / Intake
 - Oral intake
 - IV intake (IV fluids and IV medications)
 - Output
 - Urine, stool
 - Drains
 - Insensible losses
- Medication
 - Home medications
 - Hospital medications

Why Do We Use I/O and Medications?

- Fluid balance
 - Sepsis
 - Congestive heart failure
 - Liver disease
- Hemodynamics
 - Expected output vs measured output (renal perfusion)
 - Cardiac output
- Treatment for various disease states

What Can We Do with These Data?

1. What characteristics predict patients who successfully receives the 30 mL/kg IV fluid bolus as mandated by the *Surviving Sepsis* campaign, in severe sepsis?
2. How quickly do they receive it?
3. What clinical and lab biomarkers predict an increase in output recorded in surgical drains after cardiac bypass?
4. Which medications are associated with the development of ICU delirium?
5. Which characteristics predict the choice of the first-line inotropic medication given to patients in cardiogenic shock?
6. Is normal saline associated with acute kidney injury?

I/O in MIMIC-III

- **inputevents_cv**
 - https://mimic.physionet.org/mimictables/inputevents_cv/
 - Input information from the old system (CareVue, 2001-2008)
- **inputevents_mv**
 - https://mimic.physionet.org/mimictables/inputevents_mv/
 - Input information from the new system (MetaVision, 2008-2012)
- **outputevents**
 - <https://mimic.physionet.org/mimictables/outputevents/>
 - Output information, e.g. urine output
- **chartevents**
 - <https://mimic.physionet.org/mimictables/chartevents/>
 - Some special input/output events will be here, e.g. hemodialysis

I/O in eICU-CRD

- `intakeOutput`
 - <https://eicu-crd.mit.edu/eicutables/intakeoutput/>
 - Unified table for input/output information

Medication in MIMIC-III

- **prescriptions**

- <https://mimic.physionet.org/mimictables/prescriptions/>
- All prescribed medication

- **inpuvents_cv**

- https://mimic.physionet.org/mimictables/inpuvents_cv/
- Input information from the old system (CareVue, 2001-2008)
- e.g. vasopressors, insulin

- **inpuvents_mv**

- https://mimic.physionet.org/mimictables/inpuvents_mv/
- Input information from the new system (MetaVision, 2008-2012)
- e.g. vasopressors, insulin

- **notevents**

- Require NLP

Medication in eICU-CRD

- **admissiondrug** (extremely infrequently used)
- **allergy**
- **medication**
 - <https://eicu-crd.mit.edu/eicutables/medication/>
- **infusionDrug**
 - <https://eicu-crd.mit.edu/eicutables/infusiondrug/>
 - e.g. dopamine, epinephrine, ...
- **treatment**
 - Allow users to document, in a structured format

Some Tips

- Find the scripts on GitHub repo first
 - <https://github.com/MIT-LCP/mimic-code>
 - <https://github.com/MIT-LCP/eicu-code>
- Then ask if there are people also working on the similar query using Slack
- Syntax difference between PostgreSQL and BigQuery
- Get **itemid** from existing SQL query

Prerequisite

- Google account
 - To access GCP and BigQuery
- RStudio server access OR R/RStudio
 - `http://35.231.235.240:8787`

Tutorial - Fluid / Medication Data Manipulation

- Modified from LCP GitHub repositories
 - <https://github.com/MIT-LCP/mimic-code>
 - <https://github.com/MIT-LCP/eicu-code>
- <https://github.com/criticaldatacourse/hst953-2018-workshops/tree/master/1012-inout>
 - **Clone or download**
 - **Upload Rmd to RStudio server**
- What's inside the tutorial?
 - How to connect to BigQuery in R and python
 - Extracting input/output/medication information from MIMIC/eICU demo datasets
 - 9 SQL examples