



Prediction of an AKI event in ICU for Patients admitted with Sepsis / Septic Shock

Team Medasys / X-DSSP / Arnaud Roccabianca

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Dedalus
GROUP

OUR (quite diverse) TEAM



Sylvain Tostain – X-DSSP student – Agriculture
Thomas Verrier – X- DSSP – Immunologist
Clément Dufresne – X-DSSP – E-learning
Guillaume Luquiens – X-DSSP – E-commerce

Charles Meuriche – X-DSSP – Data Scientist
Arnaud Roccabianca – Intensivist – Cochin
Lise Marin – MD – Medasys software R&D
Sébastien DALLAIS – X-DSSP – Medasys Sales Dir

MOTIVATION AND INTUITION

Arnaud's Intensivist thesis

- Widespread use of resuscitation fluids in the ICU especially during sepsis
- Fluid choice (normal saline vs balanced solutions) is still debate because of discrepancies onto kidney outcomes
- Real medico-economic impact (more than 200 millions liters per year in the United States)

MOTIVATION

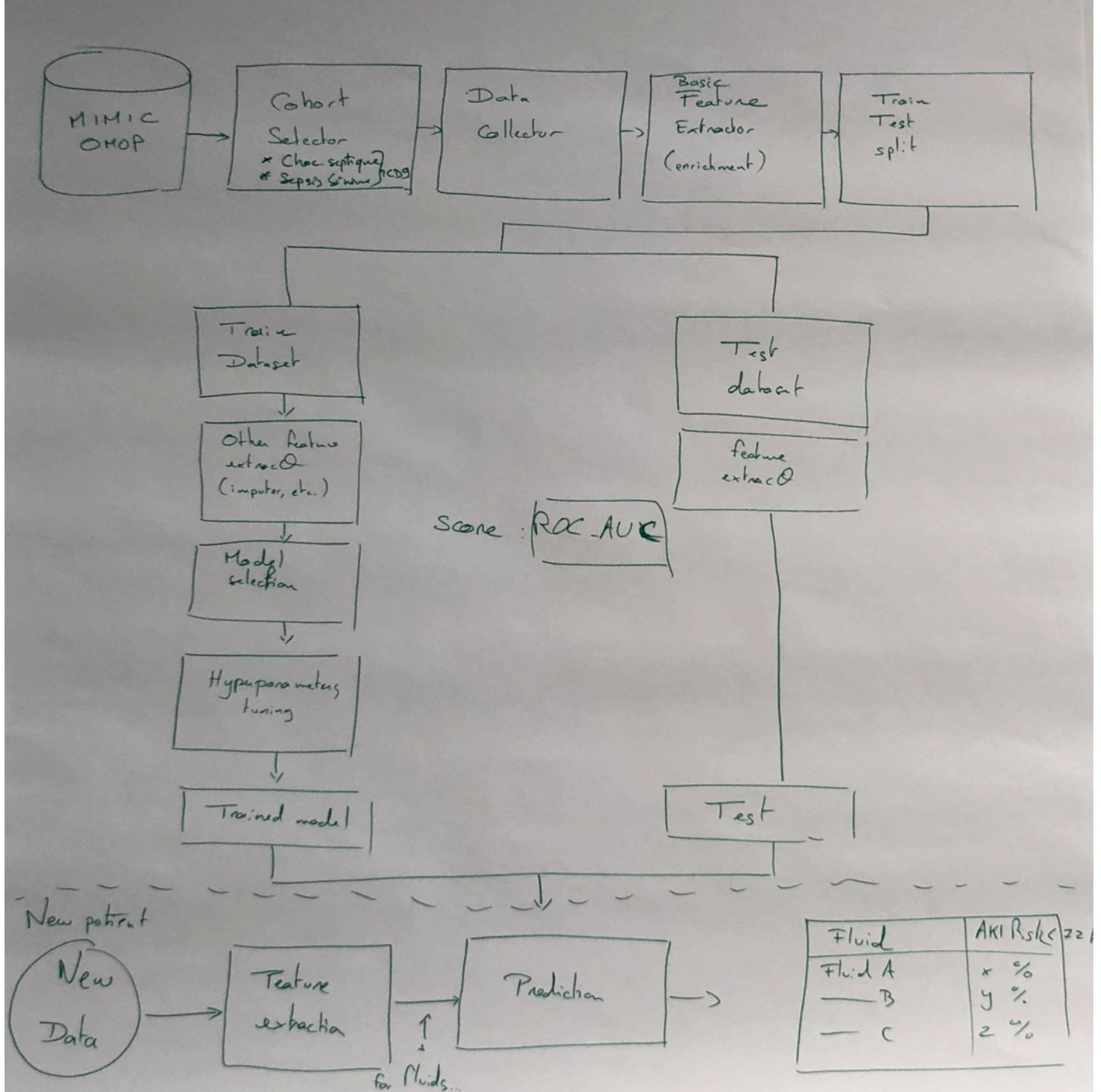
- AKI is a frequent and severe problem in ICU
- Automated prediction of an AKI is desirable
- Impact of fluid Intake is a great feature
- Leverage data and Infrastructure of DATAICU to build ML prediction function

INTUITION

- Toxicity of normal saline remains to be proven
- Fluid intake more toxic than the type of fluid
- We'll incrementally find more relevant features over time

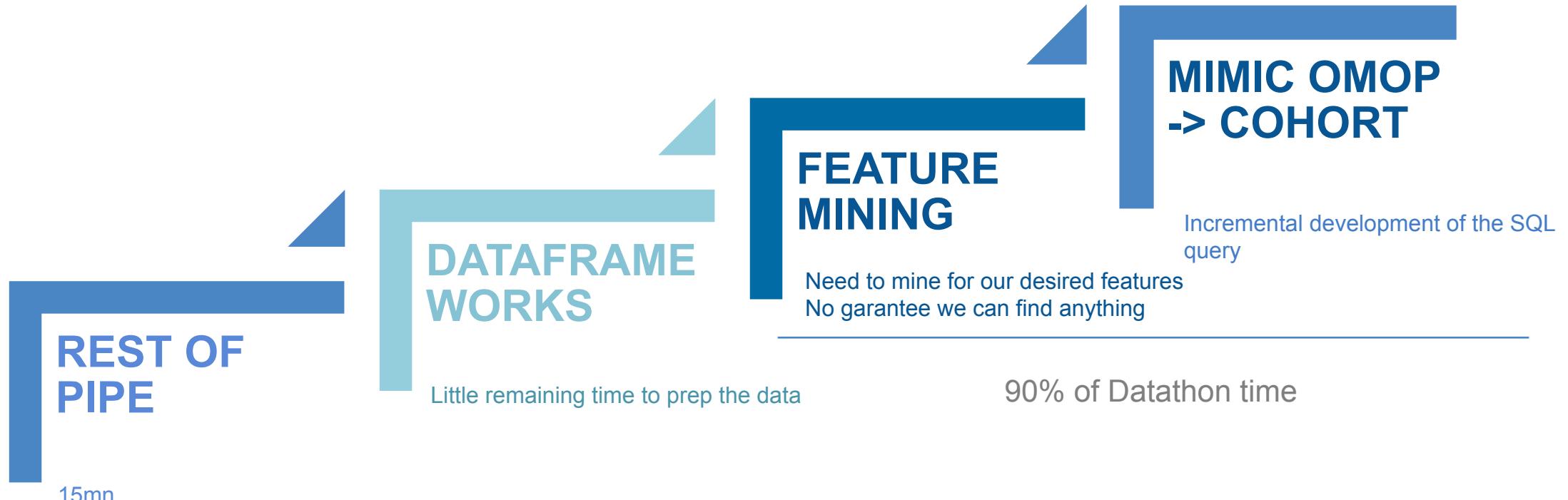
PIPELINE



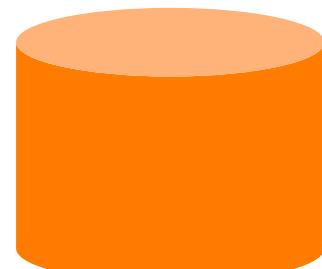


DOWN THE PIPE – TIME MANAGEMENT

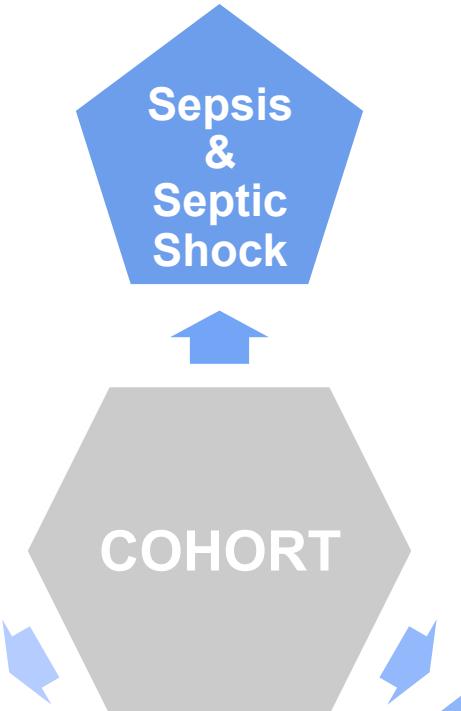
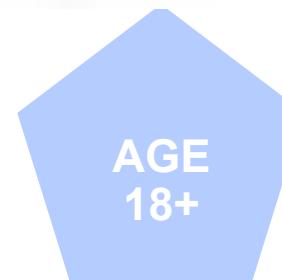
COHORT / FEATURE EXTRACTION IS THE NAME OF THE GAME



COHORT SELECTION



MIMIC
OMOP
(plus a USB stick)



Sepsis
&
Septic
Shock



FEATURES SELECTION

Resuscitation Fluid

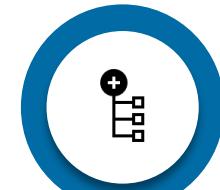
Weight
Age



Mean Arterial
Pressure
Temperature



Elixhauser
Comorbidity index



MIMIC
OMOP
(plus a USB stick)



Vancomycin
Gentamicin



RIS partagé
Mutualisation des plateaux
techniques d'imagerie

Hematocrit
chlorine



There is always just about 5 minutes missing ;)



The Missing 5 Minutes

```
In [27]: Y = pd.read_csv('Y.csv')
Y = Y.set_index("subject_id")
Y[ "visit_occurrence_id" ] = Y.index
Y.head()
```

Out[27]:

	Unnamed: 0	cohort_start_datetime	AKI	visit_occurrence_id
subject_id				
44150	0	2181-11-25 19:06:12	1	44150
33672	1	2199-08-02 19:50:04	0	33672
14078	2	2159-09-03 11:28:14	0	14078
25434	3	2109-02-17 10:03:37	0	25434
39504	4	2189-11-30 10:34:32	0	39504

```
In [28]: final = pd.merge(drugs, Y, on = 'visit_occurrence_id')
```

The Missing 5 Minutes

In [29]: `final.head()`

Out[29]:

	visit_occurrence_id	drug_source_concept_id	drug_source_value	route_source_value	drug_exposure_start_date	sum_quantity	dose_unit_sourc
0	50778	2001028669	Vancomycin	Drug Push (08-Antibiotics (IV))	2140-08-30	1	dose
1	50778	2001028669	Vancomycin	Drug Push (08-Antibiotics (IV))	2140-08-26	3	dose
2	50778	2001028669	Vancomycin	Drug Push (08-Antibiotics (IV))	2140-08-29	1	dose
3	50778	2001028669	Vancomycin	Drug Push (08-Antibiotics (IV))	2140-09-11	2	dose
4	50778	2001028669	Vancomycin	Drug Push (08-Antibiotics (IV))	2140-09-08	2	dose

In [31]: `Y = final.AKI`
`X = final.drop(["AKI", "visit_occurrence_id", "drug_exposure_start_date", "cohort_start_datetime", "Unnamed: 0"], axis=1)`
`<X`

Time's Up – Boy was that fun !



MOVING FORWARD – Completing the job & beyond

With CITI Certification

- Could work on CSV if downloaded

Appetite for More

- Promotion of Data Science

MOVING FORWARD – DATA MODELS

FLUIDS & DRUGS

- Same medication / Multiple representations
- Need for pharmaceutical class ATC & List of comp.
- SNOMED CT is not enough, need french standard DB and EU Virtual referential (medicabase)

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 2001025026 Plasma-Lyte label:[Plasma-Lyte]dbsource:[carevue]linksto:[inpuvents_cv]unitname:[]param_type:[]
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 2002779151 PlasmaLyte drug:[PlasmaLyte]prod_strength:[1000 mL Bag]drug_type:[BASE]formulary_drug_cd:[PLAS1000I]
 2001025602 or plasmalyte label:[or plasmalyte]dbsource:[carevue]linksto:[inpuvents_cv]unitname:[]param_type:[]
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Type	Code	Libellé établissement	DCI	Dosage	Voie d'adminis	ATC niv.4
MV	14515	glucose * 5 % + potassium chlorure * 0,2 % + sodium chlorure * 0,4 % ; voie parentérale ; sol p perf	GLUCOSE POTASSIUM CHLORURE SODIUM CHLORURE	50 g 2 g 4 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
MV	9072	potassium chlorure * 0,3 % + sodium chlorure * 0,9 % ; voie parentérale ; sol p perf	POTASSIUM CHLORURE SODIUM CHLORURE	3 g 9 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
MV	1336	glucose * 2,5 % + sodium chlorure * 0,45 % ; voie parentérale ; sol p perf	GLUCOSE SODIUM CHLORURE	25 g 4,5 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
MV	14516	glucose * 10 % + potassium chlorure * 0,2 % + sodium chlorure * 0,4 % ; voie parentérale ; sol p perf	GLUCOSE MONOHYDRATE POTASSIUM CHLORURE SODIUM CHLORURE	110 g 2 g 4 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
SP	3400893093542	BIONOLYTE G5, SOL PR. PERFL, FLAC 500 ML	GLUCOSE POTASSIUM CHLORURE SODIUM CHLORURE	25 g 1 g 0 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
SP	3400891405309	POLYTIONIQUE G5 MACO PHARMA, SOL PR. PERFL, POCHE 1 L MACOFLEX	GLUCOSE MONOHYDRATE POTASSIUM CHLORURE SODIUM CHLORURE	55 g 2 g 4 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
SP	3400892654447	RINGER B BRAUN, SOL PR. PERFL, POCHE 1 L ECOFLAC	CALCIUM CHLORURE DIHYDRATE POTASSIUM CHLORURE SODIUM CHLORURE	0,33 g 0,3 g 8,6 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
SP	3400892654676	RINGER B BRAUN, SOL PR. PERFL, POCHE 500 ML	CALCIUM CHLORURE DIHYDRATE POTASSIUM CHLORURE SODIUM CHLORURE	0,17 g 0,15 g 4,3 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
SP	3400892654508	RINGER B BRAUN, SOL PR. PERFL, POCHE 250 ML	CALCIUM CHLORURE DIHYDRATE POTASSIUM CHLORURE SODIUM CHLORURE	0,08 g 0,07 g 2,15 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE
SP	3400893546628	IONOVEN, SOL PR. PERFL, POCHE 1 L FREEFLEX	MANGANESE CHLORURE HEXAHYDRATE POTASSIUM CHLORURE SODIUM ACETATE TRIHYDRATE	0,3 g 0,3 g 4,63 g	IV	SOLUTIONS MODIFIANT LE BILAN ELECTROLYTIQUE



THANK YOU

