



Track patient recovery in real-time by processing streaming data

BIOMEDICAL DATA DESIGN

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Content

01 Cardiovascular Diseases

02 EICU Prediction

03 Dataset Analysis

04 Next Step

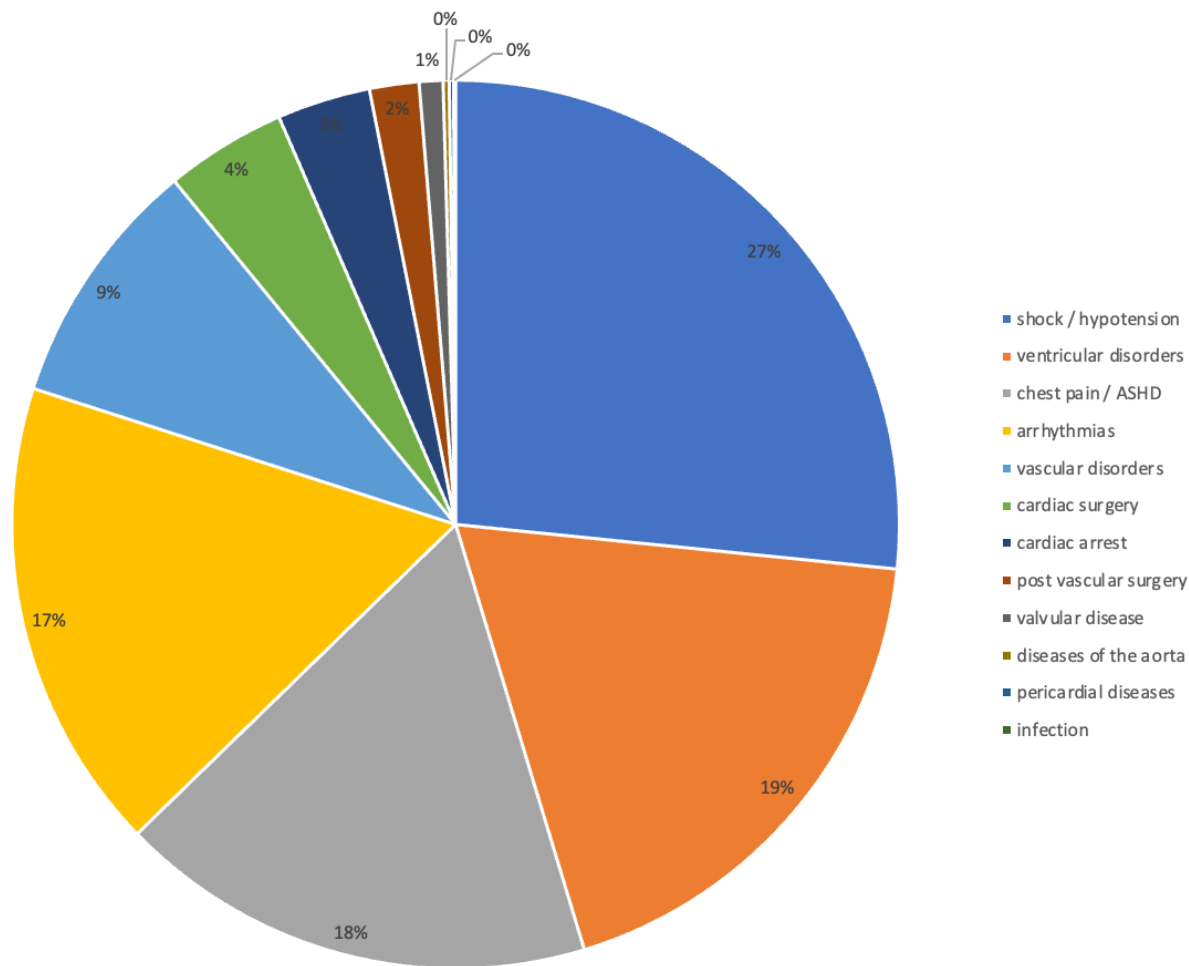
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01

Cardiovascular Diseases

Cardiovascular Diseases

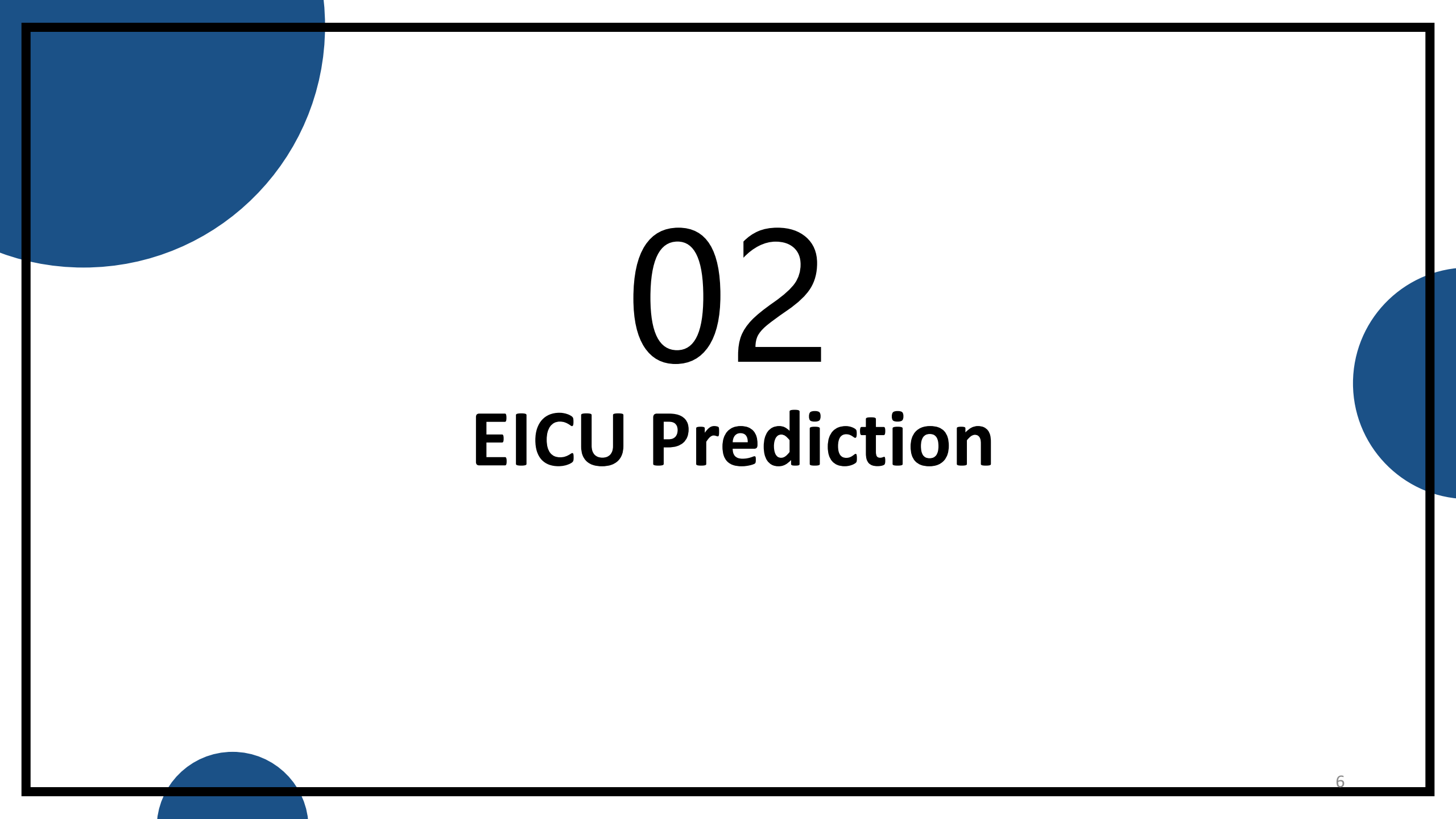
Main symptoms of the disease:



shock / hypotension	1815
ventricular disorders	1277
chest pain / ASHD	1189
arrhythmias	1174
vascular disorders	622
cardiac surgery	301
cardiac arrest	232
post vascular surgery	123
valvular disease	59
diseases of the aorta	15
pericardial diseases	11
infection	5

Cardiovascular Diseases

- 1.Heart rate
- 2.Blood pressure
- 3.Cardiac Output
- 4.Coronary Artery Blood Flow
- 5.Body Temperature (BT)
- 6.Oxygen Saturation
- 7.Peripheral Capillary Oxygen Saturation (SpO2)
- 8.Oxygen Saturation (O2sat)
- 9.C-reactive Protein (CRP)
- 10.Lipid Profile
- 11.Age,sex,smoke history, etc...

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02

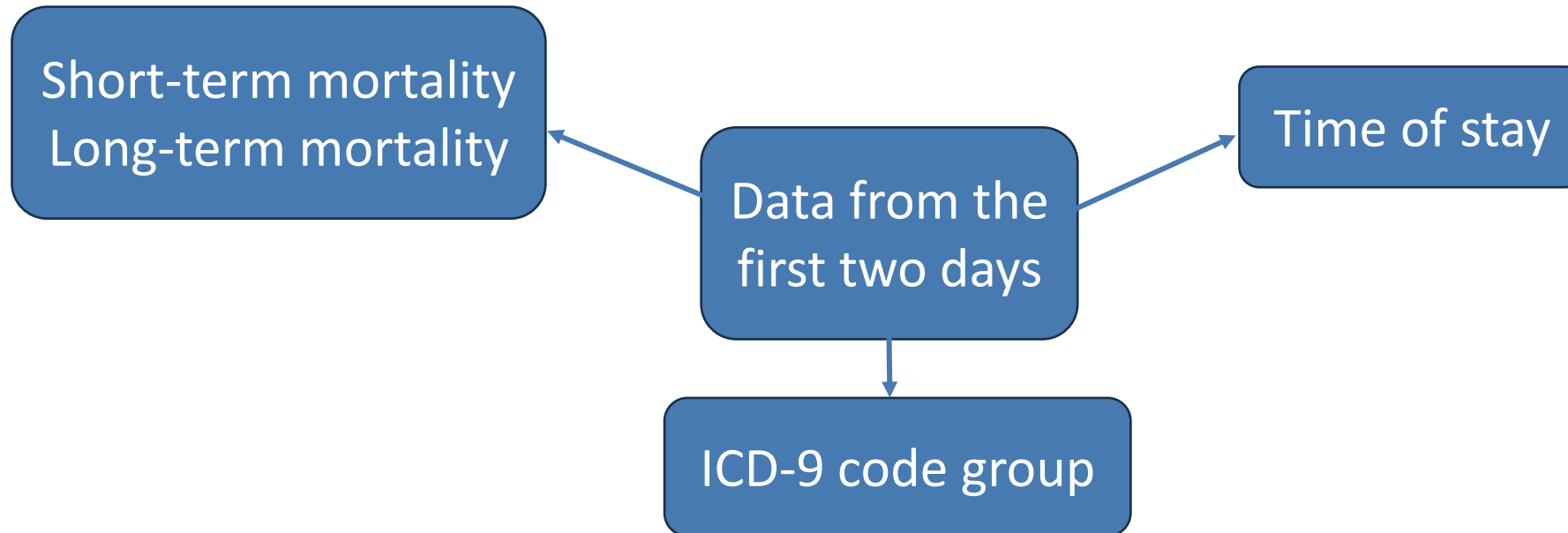
EICU Prediction

02 EICU Prediction

Benchmarking deep learning models on large healthcare datasets

[Sanjay Purushotham](#)^{a 1} ✉, [Chuizheng Meng](#)^{b 1} ✉, [Zhengping Che](#)^a ✉, [Yan Liu](#)^a 👤 ✉

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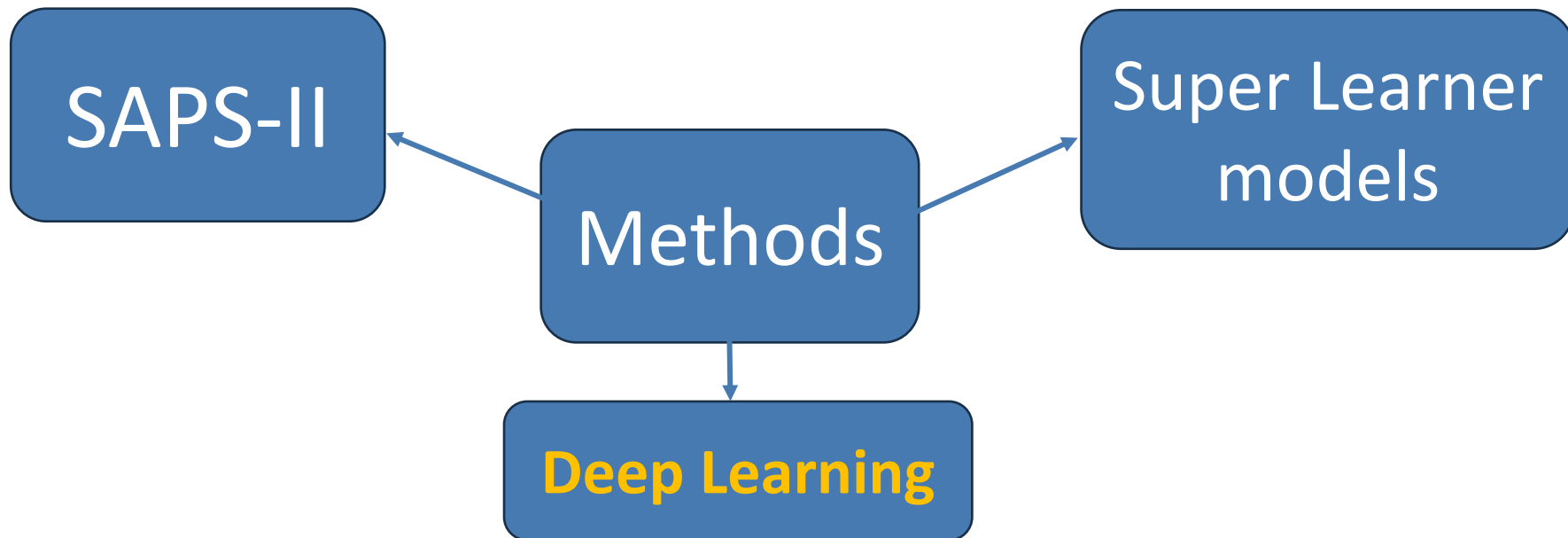


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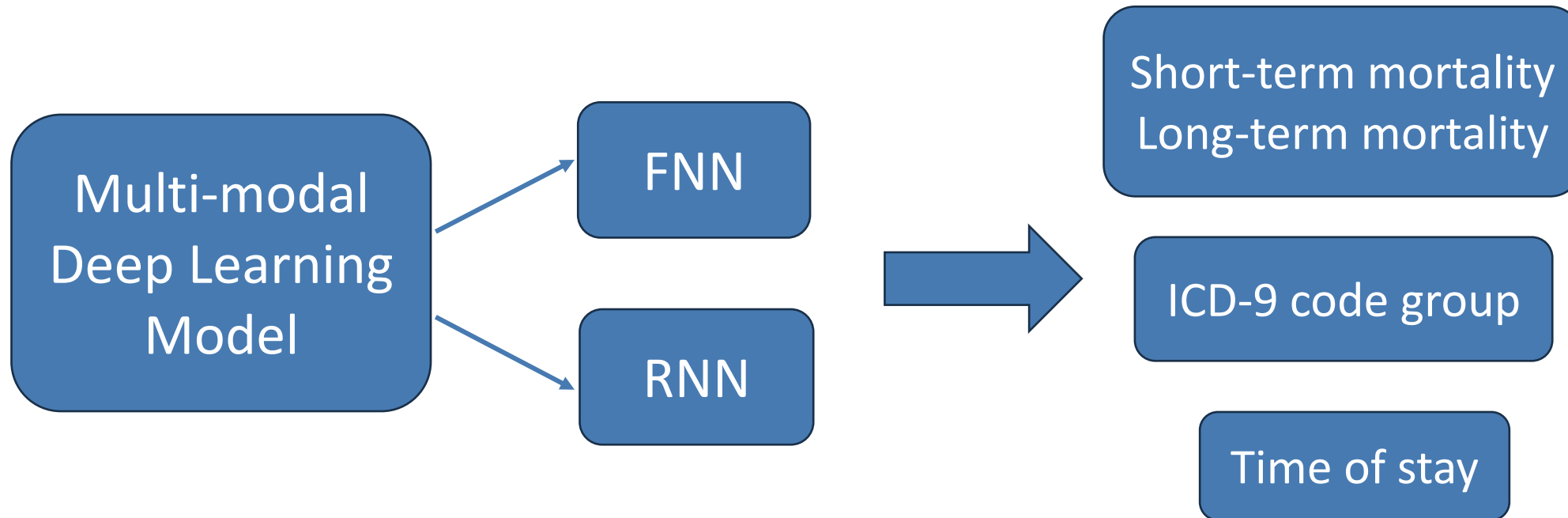


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02 EICU Prediction

Mortality

Method	Algorithm	Feature Set A, 24-h data		Feature Set A, 48-h data	
		AUROC score	AUPRC score	AUROC score	AUPRC score
	SuperLearner-II	0.8673±0.0045	0.4968±0.0097	0.8595±0.0035	0.4422±0.0200
Deep learning	FFN	0.8496±0.0047	0.4632±0.0074	0.8375±0.0041	0.4090±0.0169
	RNN	0.8544±0.0053	0.4519±0.0145	0.8618±0.0059	0.4458±0.0144
	MMDL	0.8664±0.0056	0.4776±0.0162	0.8737±0.0045	0.4714±0.0176

ICD-9 code & Time of stay



02 EICU Prediction

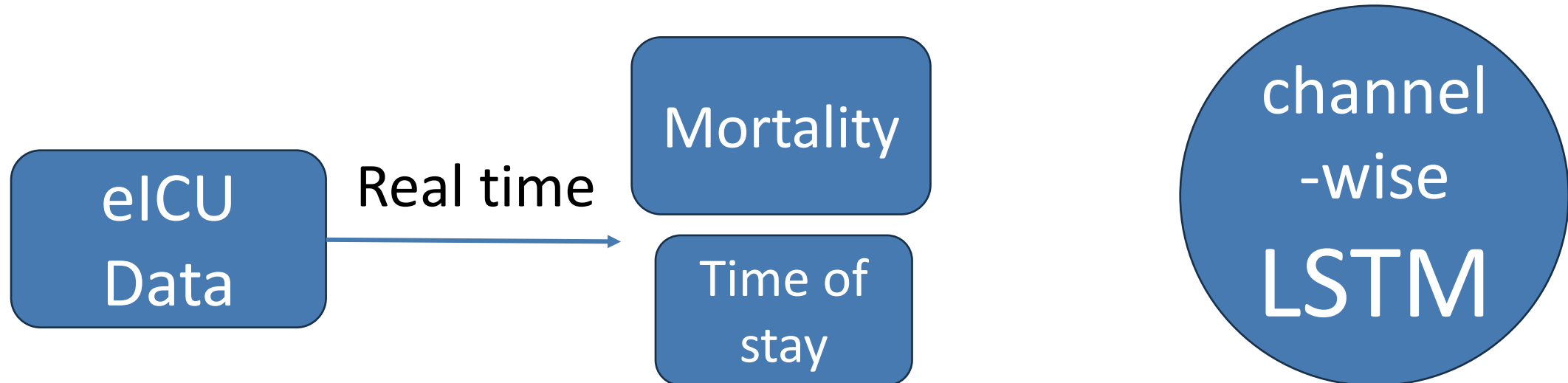
Analysis | [Open Access](#) | [Published: 17 June 2019](#)

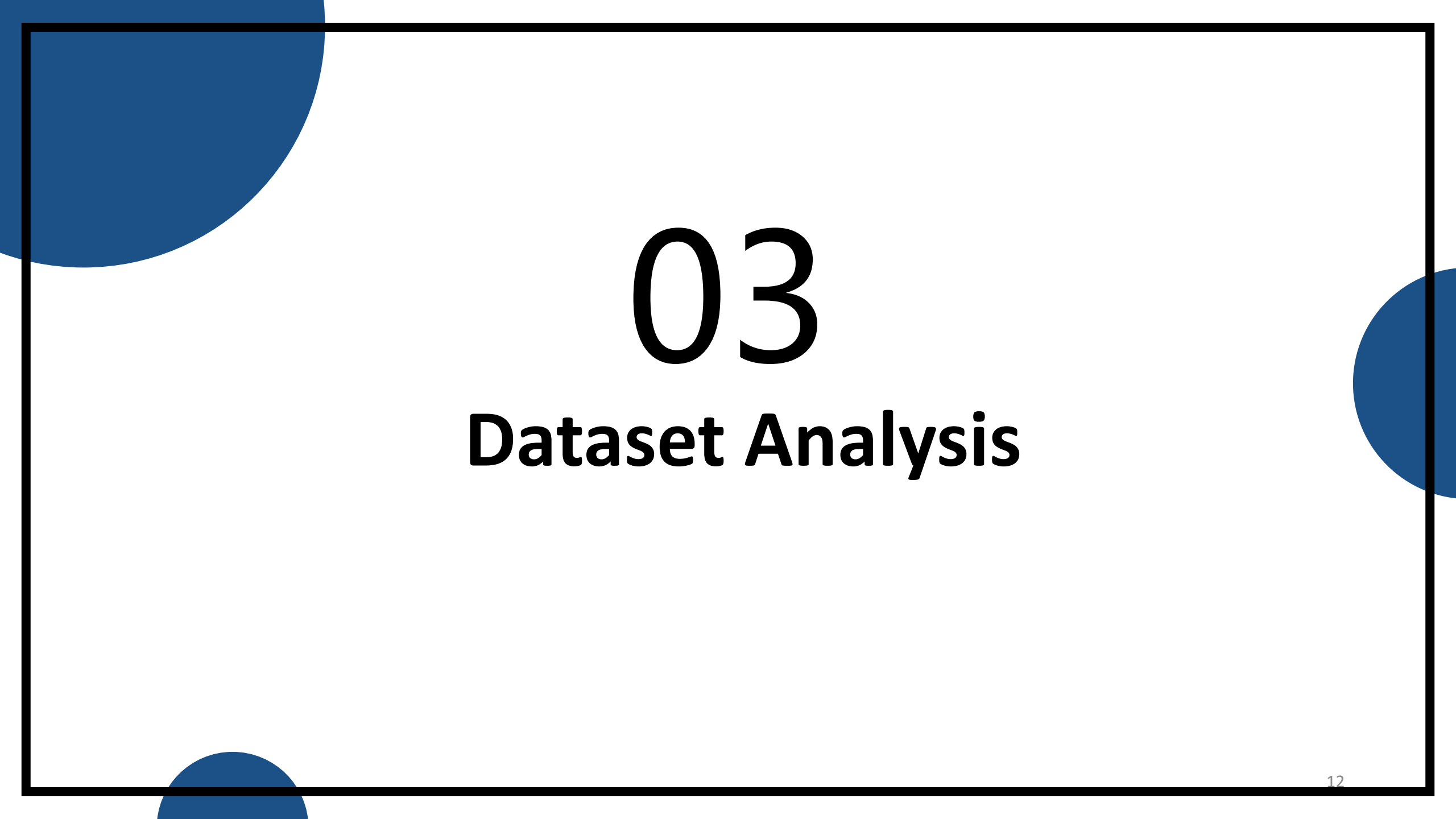
Multitask learning and benchmarking with clinical time series data

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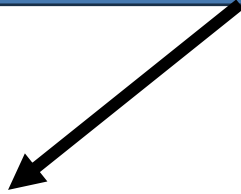
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03

Dataset Analysis

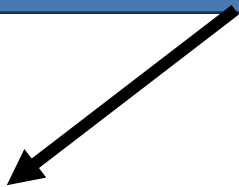
03 Dataset Analysis

vitalPeriodic & vitalAperiodic & nurseCharting



Vital signs —→ Time series

diagnosis & patient



Patients' information —→ Labels

03 Dataset Analysis

diagnosisid	patientunitstayid	activeupondischarge	diagnosisoffset	diagnosisstring
4035907	143870	TRUE	10	cardiovascular chest pain / ASHD coronary artery disease
3843251	143870	TRUE	10	cardiovascular post vascular surgery s/p cartoid endarterectomy
3460672	143870	TRUE	10	cardiovascular arrhythmias bradycardia
3717065	151179	FALSE	29	cardiovascular shock / hypotension septic shock
4102418	151179	FALSE	120	cardiovascular shock / hypotension septic shock
3885168	151179	TRUE	3929	cardiovascular shock / hypotension septic shock
4053934	151179	TRUE	3929	cardiovascular shock / hypotension hypotension
3850876	151900	FALSE	148	cardiovascular shock / hypotension septic shock
3707280	151900	FALSE	939	cardiovascular shock / hypotension septic shock
4192192	151900	FALSE	939	cardiovascular chest pain / ASHD acute coronary syndrome
3379776	151900	TRUE	2895	cardiovascular chest pain / ASHD acute coronary syndrome
3892141	151900	TRUE	2895	cardiovascular shock / hypotension septic shock
3678632	152954	FALSE	39	cardiovascular shock / hypotension signs and symptoms of sepsis (SIRS)
3977729	152954	FALSE	39	cardiovascular ventricular disorders congestive heart failure
4144394	152954	FALSE	219	cardiovascular shock / hypotension signs and symptoms of sepsis (SIRS)
3757248	152954	FALSE	219	cardiovascular ventricular disorders congestive heart failure

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04

Next Step

04 Next Step

1.Extract more meaningful data

1.1 Extraction

1.2 Interpolation, Correction

2.Replicate the deep learning model as baseline and try new models.

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Thank you

References

- [1] Rocheteau, Emma, et al. "Predicting Patient Outcomes with Graph Representation Learning." arXiv preprint arXiv:2101.03940 (2021).
- [2] The eICU Collaborative Research Database, a freely available multi-center database for critical care research. Pollard TJ, Johnson AEW, Raffa JD, Celi LA, Mark RG and Badawi O. Scientific Data (2018).