8 Appendix

8.1 Full Algorithm

Based on Equation 11 to 13, the gradient of λ (Equation 9) can be solely determined by the signals of both α and β. The full algorithm is given in Algorithm 2.

Algorithm 2: Full Algorithm for Automatic Task Selection

Randomly initialize θ_0^e, θ_0^d, $\theta_{N_P}^c$ and λ;
for $k = 1, 2, ...$ **do**
  for $i \in [1, N_P]$ **do** ▷ Self-supervised learning loop
    $\theta_i^e = \Psi_i^e\left(\theta_{i-1}^e, \theta_{i-1}^d, \lambda_k\right), \theta_i^d = \Psi_i^d\left(\theta_{i-1}^e, \theta_{i-1}^d, \lambda_k\right)$; ▷ Gradient descent
    $\mathbf{H}_i^e \leftarrow \nabla_{\theta_i^e} \Psi_{i+1}^e(\theta_i^e, \theta_i^d, \lambda)$; ▷ Record Hessian Matrix
    $\mathbf{J}_i^e \leftarrow \nabla_\lambda \Psi_i^e(\theta_{i-1}^e, \theta_{i-1}^d, \lambda)$; ▷ Record Jacobian for λ over Gradient
  for $i \in [N_P + 1, N_P + N_S]$ **do** ▷ Supervised learning loop
    $\theta_i^e = \Phi_i^e\left(\theta_{i-1}^e, \theta_{i-1}^c\right), \theta_i^c = \Phi_i^c\left(\theta_{i-1}^e, \theta_{i-1}^c\right)$; ▷ Gradient descent
    $\mathbf{H}_i^e \leftarrow \nabla_{\theta_i^e} \Phi_{i+1}^e(\theta_i^e, \theta_i^c)$; ▷ Record Hessian Matrix
  $\beta_{N_S} \leftarrow \nabla_{\theta_{N_S}^e} \ell_{\text{val}}^c$; ▷ Initialize multiplier
  for $i \in [N_P + N_S - 1, N_P + 1]$ **do** ▷ Reverse steps of supervised loop
    $\beta_i \leftarrow \beta_{i+1} \mathbf{H}_i^e$; ▷ Update multiplier
  $\alpha_{N_P} = \beta_{N_P+1} \mathbf{H}_{N_P}^e$; ▷ Transfer Supervised to Self-supervised
  $g \leftarrow 0$; ▷ Initialize hyper-gradient
  for $i \in [N_P, 1]$ **do** ▷ Reverse steps of self-supervised loop
    $g_\lambda \leftarrow g_\lambda + \alpha_{i+1} \mathbf{J}_{i+1}^e$; ▷ Update hyper-gradient
    $\alpha_i \leftarrow \alpha_{i+1} \mathbf{H}_i^e$; ▷ Update multiplier
  $\lambda_i = \lambda_{i-1} - \epsilon \cdot g_\lambda$; ▷ Hyper-gradient descent
return $\theta_{N_P}^e$, λ

Note that the gradient descent steps follow the following equations:

$$\Psi_i^e(\theta_{i-1}^e, \theta_{i-1}^d, \lambda) = \theta_{i-1}^e - \eta^p \nabla_{\theta^e} \ell_{\text{train}}^p(\theta^e, \theta^d, \lambda) \tag{15}$$

$$\Phi_i^e(\theta_{i-1}^e, \theta_{i-1}^c) = \theta_{i-1}^e - \eta^c \nabla_{\theta^e} \ell_{\text{train}}^c(\theta^e, \theta^c) \tag{16}$$

where η^p and η^c are the learning rates for the self-supervised training and supervised training respectively. As thus, $\nabla_\lambda \Psi_i^e(\theta_{i-1}^e, \theta_{i-1}^d, \lambda)$, $\nabla_{\theta_i^e} \Psi_{i+1}^e(\theta_i^e, \theta_i^d, \lambda)$ and $\nabla_{\theta_i^e} \Phi_{i+1}^e(\theta_i^e, \theta_i^c)$ include the Jacobian and Hessian matrix of the gradient update operation Ψ_i^e and Φ_{i+1}^e and are cached during the learning loops. Also to simplify notations, we overloaded N_S and use β_{N_S} and $\nabla_{\theta_{N_S}^e}$ to represent $\beta_{N_S+N_P}$ and $\nabla_{\theta_{N_S+N_P}^e}$ in the algorithm.

8.2 Dataset and Data Preprocessing

We evaluate our proposed algorithm using the open access MIMIC-III dataset [17] which contains patients admitted to the intensive care unit of Beth Israel Deaconess Medical Center between 2001 and 2012.

Table 4: Task definition and statistics.

Task	Definition	Positive	Negative	Excluded
Mortality	patient expired	597	36,773	1,115
Shock	mean blood pressure $\leq$ 65	3,418	15,159	19,908
Kidney Failure	creatinine $\geq$ 2mg/dl	526	32,055	5,904
Liver Failure	bilirubin $\geq$ 2mg/dl	387	34,856	3,242

There are 38,485 adult inpatient encounters included in the study. Supervised tasks were triggered at 48 hrs after ICU admission with a lookahead horizon of 48 hours (i.e. 48-96 hours post admission) for the following endpoints: inpatient mortality, renal and liver failure, and circulatory shock. For this proof of concept work, the latter three organ failure endpoints were defined in a lightweight manner

based on SOFA score criteria [18], as described in Table 4, rather than using more detailed definitions taking into account baseline values.

The positive (negative) columns are the number of encounters where the corresponding events are observed (unobserved) after the prediction time (i.e., 48 hrs after ICU admission) and within the prediction window (i.e. 48-96 hours post admission). The excluded column counts the encounters where the corresponding event occurs before the prediction time. We only include the encounters greater than 48 hours in length and where the outcome of interest did not occur within the first 48 hrs.

We select the 96 most frequently occurring lab measurements, vital signs and interventions/equipment settings as features to define the trajectory forecast tasks, as listed in Table 9. As different coding systems are used in MIMIC-III, we harmonize the medical codes corresponding to the same lab/vital measurement as a single feature. In addition, we standardize the units when a medical code is used with multiple units or without a unit. The data preprocessing steps are summarized as follows:

1. **Code harmonization**. This is a manual process based on input from clinical experts. In this step, the medical codes corresponding to the same measurements from different coding systems, including LOINC and MIMIC specific coding, are harmonized into the same entity. For example, serum creatinine is associated with the following MIMIC-III specific codes: 220615, 50912, 1525, 3750, 791, and LOINC code 2160-0.

2. **Unit conversion**. This is an automated process with manual review. In MIMIC-III, a medical code may be stored in multiple units and sometimes the unit might be missing. To determine whether these two entries correspond to the same measurement concept, we derive its value range and mean under different units and test whether they are similar to each other. The final results are reviewed manually.

3. **Outlier removal**. We derive the distribution of each measurement code after harmonization and unit conversion. We remove the outliers, defined as $< 0.1\times$ the value at the 1st percentile or $> 10\times$ the value at the 99th percentile.

4. **Value normalization**. We collect the mean and standard deviation over the cleaned dataset for each harmonized code and compute its z-score as feature value.

5. **Time bucketing**. Each timestep in the experiment corresponds to 1 hour. If multiple measurements exist within this 1 hour for the same clinical feature, we take its average value.

In Table 9, the first column is the name and unit of the feature after harmonization. The second column includes all the names being used for this feature in the MIMIC-III dataset. The corresponding MIMIC-specific and LOINC codes are listed in the third and fourth columns. The 'Units' column lists all the original units associated with this feature. We use 'null' to denote the case where unit is left empty in the dataset. Finally, the last column lists the number of appearances of this feature in the dataset.

Table 5: Hyperparameter Selection.

Hyperparameter	**Values/Range Considered**	**Selection Criteria**	**Value Selected**
Learning rate for supervised learning	{0.0005, 0.001, 0.05, 0.01}	Validation AUC for supervised training and fine-tune after pretraining	0.001
Learning rate for self-supervised learning	{0.0005, 0.001, 0.05, 0.01}	Validation MSE in pretraining	0.005
Learning rate for λ update	{0.001, 0.01, 0.1}	Validation AUC for fine-tune after pretraining	0.01
State size for LSTM	Range [20, 100] with increment of 10	Validation MSE in pretraining and validation AUC for supervised training	70

Task	Data	Supervised	Pretrain (All)	CoTrain	AutoSelect
Mortality	1%	0.738 (0.017)	0.809 (0.010)	0.725 (0.014)	**0.833** (0.017)
	10%	0.853 (0.016)	0.853 (0.013)	0.854 (0.014)	**0.882** (0.012)
	100%	0.899 (0.008)	0.899 (0.011)	0.902 (0.009)	**0.909** (0.008)
Shock	1%	0.730 (0.022)	0.778 (0.031)	0.718 (0.041)	**0.838** (0.022)
	10%	0.754 (0.040)	0.772 (0.028)	0.724 (0.031)	**0.833** (0.018)
	100%	0.886 (0.026)	0.881 (0.030)	0.892 (0.018)	**0.899** (0.021)
Kidney F.	1%	0.745 (0.015)	0.771 (0.021)	0.748 (0.020)	**0.823** (0.018)
	10%	0.849 (0.015)	0.828 (0.012)	0.849 (0.012)	**0.862** (0.018)
	100%	0.901 (0.011)	0.907 (0.007)	0.899 (0.009)	**0.910** (0.011)
Liver F.	1%	0.721 (0.017)	0.780 (0.010)	0.707 (0.027)	**0.822** (0.013)
	10%	0.863 (0.015)	0.832 (0.009)	0.832 (0.009)	**0.866** (0.016)
	100%	0.896 (0.011)	0.896 (0.009)	0.896 (0.008)	**0.908** (0.007)

Table 6: Predictive performance (AUC-ROC) of different competing methods for the four primary outcome prediction tasks under consideration with respect to different levels of data-scarcity.

Task	Data	Supervised	Pretrain (All)	CoTrain	AutoSelect
Mortality	1%	0.047 (0.004)	0.073 (0.007)	0.056 (0.007)	**0.097** (0.009)
	10%	0.127 (0.011)	0.154 (0.015)	0.135 (0.009)	**0.168** (0.024)
	100%	0.267 (0.028)	0.268 (0.019)	0.262 (0.028)	**0.291** (0.033)
Shock	1%	0.035 (0.005)	0.052 (0.015	0.054 (0.019)	**0.080** (0.019)
	10%	0.086 (0.025)	0.096 (0.029)	0.082 (0.021)	**0.109** (0.031)
	100%	0.109 (0.031)	0.206 (0.052)	0.203 (0.057)	**0.206** (0.050)
Kidney F.	1%	0.047 (0.002)	0.074 (0.013)	0.075 (0.011)	**0.105** (0.009)
	10%	0.126 (0.014)	0.113 (0.013)	0.115 (0.014)	**0.144** (0.014)
	100%	0.204 (0.017)	0.223 (0.012)	0.226 (0.016)	**0.249** (0.017)
Liver F.	1%	0.040 (0.004)	0.076 (0.016)	0.046 (0.008)	**0.085** (0.011)
	10%	0.120 (0.015)	0.107 (0.011)	0.122 (0.015)	**0.156** (0.021)
	100%	0.229 (0.018)	0.184 (0.012)	0.226 (0.015)	**0.257** (0.015)

Table 7: Predictive performance (AUC-PR) of different competing methods for the four primary outcome prediction tasks under consideration with respect to different levels of data-scarcity.

8.3 Hyperparameters and Selections

The learning rates of all training loops were tuned jointly with the state size of LSTM via a grid search. Table 5 shows the list of values considered, the criteria we use in choosing the hyperparameter and the final value selection.

8.4 Additional Experiment Results

Table 6 provides predictive performance (AUC-ROC) over the additional Liver Failure prediction task along with the other three tasks. We also report the AUC-PR (i.e., Average Precision (AP)) of different competing methods for the four primary outcome prediction tasks under consideration in Table 7. As we could see, AutoSelect outperforms both 'Pretrain (All)' and 'CoTrain' by a significantly large margin in low-data scenarios for all four tasks with respect to both metrics.

8.5 Top Tasks

The features that are associated with the top trajectory forecast auxiliary tasks for each primary task are listed in Table 8.

Table 8: Top Trajectory Forecast Tasks.

Task	Top Features
Mortality	Invasive/Non-invasive blood pressure (diastolic, mean, systolic), anion gap, heart rate, respiratory rate, minute ventilation obs, urine output foley, temperature, o2 saturation p, o2 flow, magnesium, sodium, glucose poc, calcium, glucose, hemoglobin, paw, arterial base excess, mean chc, arterial bicarbonate, base excess, rbc.
Shock	Invasive/Non-invasive blood pressure (diastolic, mean, systolic), heart rate, respiratory rate, urine output foley, temperature, o2 saturation p, o2 flow, magnesium, sodium, glucose, hemoglobin, paw.
Kidney Failure	Invasive/Non-invasive blood pressure (diastolic, mean, systolic), heart rate, respiratory rate, urine output foley, temperature, o2 saturation p, magnesium, sodium, glucose.
Liver Failure	Invasive/Non-invasive blood pressure (diastolic, mean, systolic), anion gap, heart rate, respiratory rate, minute ventilation obs, urine output foley, temperature, o2 saturation p, magnesium, sodium, glucose poc, calcium, glucose, hemoglobin, mean chc.

Table 9: List of input features used in the model.

Harmonized Name	Display Names	MIMIC code	LOINC code	Units	Count
Access pressure @mmHg	Access Pressure, Access mmHg	224149, 29		mmHg	11490
Albumin @G_PER_DL	Albumin, Albumin (3.9-4.8), Albumin (>3.2)	1521, 227456, 3727, 50862, 772	1751-7	G_PER_DL, null	161658
Alt @IU_PER_L	ALT, Alanine Aminotransferase (ALT)	220644, 50861, 769	1742-6	IU_PER_L, null	244169
Anion gap @MEQ_PER_L	Anion gap, Anion Gap (8-20), Anion Gap	227073, 3732, 50868	1863-0	MEQ_PER_L, null	869575
Ap @IU_PER_L	Alkaline Phosphate, Alkaline Phosphatase, Alk. Phosphate	225612, 3728, 50863, 773	6768-6	null, IU_PER_L	232122
Arterial base excess @MEQ_PER_L	Arterial Base Excess	224828, 776		null, MEQ_PER_L	271605
Arterial bicarbonate @MEQ_PER_L	TCO2 (calc) Arterial, Arterial CO2(Calc)	225698, 777		MEQ_PER_L	406734
Arterial pco2 @mmHg	Arterial CO2 Pressure, Arterial PaCO2	220235, 778		mmHg	406498
Arterial ph @PH	Art.pH, PH (Arterial), pH (Art), Arterial pH	1126, 223830, 4753, 780		PH, null	430827
Arterial po2 @mmHg	Arterial O2 pressure, Arterial PaO2	220224, 779		mmHg	406341
Ast @IU_PER_L	AST, Asparate Aminotransferase (AST)	220587, 50878, 770	1920-8	null, IU_PER_L	244187
Base excess @MEQ_PER_L	Base Excess	50802	11555-0	null, MEQ_PER_L	329827
Basophils @PERCENT	Basophils	51146	704-7	null, PERCENT	172039
Blood flow @ML_PER_MIN	Blood Flow (ml/min), Blood Flow ml/min	224144, 79		ML_PER_MIN	116654
Bp diastolic invasive @mmHg	Arterial Blood Pressure diastolic, ART BP Diastolic, Arterial BP [Diastolic], Arterial BP 2 [Diastolic]	220051, 225310, 8368, 8555		mmHg	3292274
Bp diastolic non invasive @mmHg	Non Invasive Blood Pressure diastolic, Manual Blood Pressure Diastolic Left, Manual Blood Pressure Diastolic Right, Manual BP [Diastolic], NBP [Diastolic]	220180, 224643, 227242, 8440, 8441		mmHg	2863944
Bp map invasive @mmHg	Arterial Blood Pressure mean, ART BP mean, Arterial BP Mean, Arterial BP Mean 2, Arterial Mean 3	220052, 225312, 52, 6702, 6927		mmHg	3280702

Table 9: List of input features used in the model.

Harmonized Name	Display Names	MIMIC code	LOINC code	Units	Count
Bp mean non invasive @mmHg	Non Invasive Blood Pressure mean, Manual BP Mean(calc), NBP Mean	220181, 443, 456		mmHg	2843856
Bp systolic invasive @mmHg	Arterial Blood Pressure systolic, ART BP Systolic, Arterial BP [Systolic], Arterial BP 2 [Systolic]	220050, 225309, 51, 6701		mmHg	3293052
Bp systolic non invasive @mmHg	Non Invasive Blood Pressure systolic, Manual Blood Pressure Systolic Left, Manual Blood Pressure Systolic Right, Manual BP [Systolic], NBP [Systolic]	220179, 224167, 227243, 442, 455		mmHg	2865402
Bun @MG_PER_DL	BUN, BUN (6-20), Urea Nitrogen, BUN (6-20)	1162, 225624, 3737, 51006, 781	3094-0	MG_PER_DL, null	893969
Calcium @	Calcium, Calcium non-ionized, Calcium (8.8-10.8), Calcium, Total, Calcium (8.4-10.2)	1522, 225625, 3746, 50893, 786	2000-8	MEQ_PER_L, null	323
Calcium @MEQ_PER_L	Calcium, Calcium non-ionized, Calcium (8.8-10.8), Calcium, Total, Calcium (8.4-10.2)	1522, 225625, 3746, 50893, 786	2000-8	MEQ_PER_L, null	681992
Cardiac index @UNKNOWN_UOM	Cardiac Index, Cardiac Index (CI NICOM)	116, 228368		UNKNOWN_UOM, L_PER_MIN_PER_M2	209483
Cardiac output rate @L_PER_MIN	Cardiac Output (thermodilution), Cardiac Output (CCO), CO (Arterial), CO (PiCCO), Cardiac Output (CO NICOM), C.O. (fick), C.O.(thermodilution)	220088, 224842, 227543, 228178, 228369, 89, 90		L_PER_MIN	294655
Chloride @MEQ_PER_L	Chloride, Chloride (serum), Chloride (whole blood), Chloride (100-112), Chloride, Whole Blood, Chloride (100-112)	1523, 220602, 226536, 3747, 50806, 50902, 788	2069-3, 2075-0	MEQ_PER_L, null	959368
Co2 @MEQ_PER_L	HCO3 (serum), Calculated Bicarbonate, Whole Blood, Bicarbonate, Carbon Dioxide, HCO3	227443, 50803, 50882, 787, 812	1959-6, 1963-8	null, MEQ_PER_L	891999
Creatine kinase @IU_PER_L	CK (CPK), Creatine Kinase (CK), CPK	225634, 50910, 784	2157-6	IU_PER_L, null	149871
Creatinine @MG_PER_DL	Creatinine, Creatinine (0-0.7), Creatinine (0-1.3)	1525, 220615, 3750, 50912, 791	2160-0	MG_PER_DL, null	899717
Creatinine kinase mb @NG_PER_ML	CK-MB, Creatine Kinase, MB Isoenzyme, CPK/MB	227445, 50911, 785	6773-6	NG_PER_ML, null	89737
Cvp @mmHg	CVP, Central Venous Pressure	113, 220074		mmHg, PERCENT	1680374
Eosinophils @PERCENT	Eosinophils	51200	711-2	null, PERCENT	172042
Exhaled minute ventilation low @	High exhaled min vol, high exhaled min vol, HIGH EXHALED MIN VOL, High Exhaled min vol, high exhaled min.vol, High exhaled min.vol, high exhale MV, HIGH EXHALE MV, High exhaled MV, High exhale MV, high exhale mv, Low Exhaled Min Vol, High Exhaled Min vol	1010, 1102, 1223, 1313, 1323, 1380, 1720, 1723, 1724, 2123, 2127, 434, 5744		L_PER_MIN, null	186

Table 9: List of input features used in the model.

Harmonized Name	Display Names	MIMIC code	LOINC code	Units	Count
Exhaled minute ventilation low @L_PER_MIN	High exhaled min vol, high exhaled min vol, HIGH EXHALED MIN VOL, High Exhaled min vol, high exhaled min.vol, High exhaled min.vol, high exhale MV, HIGH EXHALE MV, High exhaled MV, High exhale MV, high exhale mv, Low Exhaled Min Vol, High Exhaled Min vol	1010, 1102, 1223, 1313, 1323, 1380, 1720, 1723, 1724, 2123, 2127, 434, 5744		L_PER_MIN, null	386163
Expiratory ratio @RATIO	Expiratory Ratio	226871		RATIO	207217
Fio2 analyzed @TORR	FiO2 (Analyzed)	189		TORR	6914
Glucose @MG_PER_DL	Glucose, Glucose (serum), Glucose (whole blood), Glucose (70-105)	1529, 220621, 226537, 50809, 50931, 811	2339-0, 2345-7	MG_PER_DL, null	1172288
Glucose poc @MG_PER_DL	Glucose finger stick, Fingerstick Glucose	225664, 807		MG_PER_DL	678665
Heart rate @BPM	Heart Rate	211, 220045		BPM	7938853
Hematocrit @PERCENT	Hematocrit (serum), Hematocrit (whole blood - calc), Hematocrit (35-51), Hematocrit, Calculated, Hematocrit	220545, 226540, 3761, 50810, 51221, 813	20570-8, 4544-3	null, PERCENT	1094791
Hemoglobin @G_PER_DL	Hemoglobin, HGB (10.8-15.8), Absolute Hemoglobin	220228, 3759, 50811, 50855, 51222, 814	718-7	G_PER_DL, null	942483
Inr @RATIO	INR, INR(PT), INR (2-4 ref. range)	1530, 227467, 51237, 815	5895-7	RATIO, null	161338
Inr @	INR, INR(PT), INR (2-4 ref. range)	1530, 227467, 51237, 815	5895-7	RATIO, null	371373
Insp pressure @CM_H2O	High Insp. Pressure, low insp pressure, Low Insp. Pressure, Low insp pressure, low IP	218, 3143, 436, 6864, 7094		CM_H2O	384580
Insp time @S	Insp. Time, Inspiratory Time, Insp.Time, Insp time	1655, 2000, 224738, 3009, 6315		null, S	364845
Inspiratory ratio @RATIO	Inspiratory Ratio	226873		RATIO	206635
Ionized calcium @MEQ_PER_L	Ionized Calcium, Free Calcium	225667, 50808, 816	1994-3	null, MEQ_PER_L	303125
Ketones urine @MG_PER_DL	Ketone	51484	5797-6	MG_PER_DL	10617
Lactate @MMOL_PER_L	Lactic Acid, Lactate, Lactic Acid(0.5-2.0)	1531, 225668, 50813, 818	32693-4	MMOL_PER_L, null	233021
Lymphocytes diff @PERCENT	Differential-Lymphs	225641, 798		PERCENT	41425
Magnesium @MG_PER_DL	Magnesium, Magnesium (1.6-2.6)	1532, 220635, 50960, 821	2601-3	MG_PER_DL, null	762825
Mean ch @PG	MCH	51248	785-6	null, PG	747387
Mean chc @PERCENT	MCHC	51249	786-4	null, PERCENT	747756
Mean cv @FL	MCV	51250	787-2	null, FL	747377
Minute ventilation obs @L_PER_MIN	Minute Volume, Minute Volume(Obser)	224687, 448, 450		L_PER_MIN	851154
Monocytes @PERCENT	Monocytes	51254	742-7	null, PERCENT	172044
Neutrophils urine @PERCENT	Neutrophils	51256	761-7	null, PERCENT	170591

Table 9: List of input features used in the model.

Harmonized Name	Display Names	MIMIC code	LOINC code	Units	Count
O2 flow @L_PER_MIN	O2 Flow, O2 Flow (additional cannula), O2 Flow (lpm), O2 Flow (lpm) 2	223834, 227287, 470, 471, 50815	3151-8	L_PER_MIN	622606
O2 saturation @PERCENT	Arterial O2 Saturation, Oxygen Saturation, SaO2	220227, 50817, 834	20564-1	PERCENT, null	1828799
O2 saturation p @PERCENT	O2 saturation pulseoxymetry, SpO2, SpO2-L	220277, 646, 6719		PERCENT	6086176
P co2 @mmHg	pCO2	50818	11557-6	null, mmHg	490470
P o2 @mmHg	pO2	50821	11556-8	null, mmHg	490481
Paw @CM_H2O	MEAN AIRWAY PRESS, PAW, Paw High, Mean Airway Pressure, Mean PAW, Mean PAW [Meas]	1672, 2229, 223873, 224697, 3502, 3503, 444		null, CM_H2O	1101930
Peep observed @CM_H2O	PEEP, MEASURED PEEP	505, 6924		CM_H2O, null	350192
Ph @PH	PH, pH	1673, 50820	11558-4	null, PH	530708
Ph urine @PH	urine pH, urine ph, Urine pH, PH (dipstick), pH, urine PH	1352, 1495, 1880, 220734, 51491, 6754	5803-2	PH, null	129352
Phosphorous @MEQ_PER_L	Phosphorous, Phosphate, Phosphorous(2.7-4.5)	1534, 225677, 50970, 827	2777-1	null, MEQ_PER_L	681128
Plateau pressure @CM_H2O	Plateau Pressure	224696, 543		CM_H2O	242730
Platelet @	Platelet Count, Platelet (150-440), Platelets	227457, 3789, 51265, 828	777-3	K_PER_UL, null	5313
Platelet @K_PER_UL	Platelet Count, Platelet (150-440), Platelets	227457, 3789, 51265, 828	777-3	K_PER_UL, null	865223
Potassium @MEQ_PER_L	Potassium, Potassium (serum), Potassium (whole blood), Potassium (3.5-5.3), Potassium, Whole Blood, Potassium (3.5-5.3)	1535, 227442, 227464, 3792, 50822, 50971, 829	2823-3, 6298-4	MEQ_PER_L, null	1181418
Potassium urine @MEQ_PER_L	Potassium, Urine	51097	2828-2	null, MEQ_PER_L	10850
Protein urine @MG_PER_DL	Protein	51492	5804-0	null, MG_PER_DL	36043
Psv @UNKNOWN_UOM	PSV Level, Pressure Support, pressure support, PSV	224701, 578, 7332, 7595		CM_H2O, null, UNKNOWN_UOM	406535
Pt @S	PT, Prothrombin time, Pro Time, PT(11-13.5)	1286, 227465, 3793, 51274, 824	5902-2	S, null	530740
Ptt @S	PTT, Ptt, PTT(22-35)	1533, 227466, 3796, 51275, 825	3173-2	S, null	539725
Rbc @PER_UL	Red Blood C(3.6-6.2), RBC(3.6-6.2), Red Blood Cells, RBC	3799, 4197, 51279, 833	789-8	PER_UL, null	748036
Rdw @PERCENT	RDW	51277	788-0	null, PERCENT	746239
Replacement rate @ML_PER_H	Replacement Rate, Replace Rate ml/hr	224153, 611		ML_PER_H	118496
Respiratory rate @BREATHS_PER_MIN	High Resp. Rate, Respiratory Rate, high rr, Resp Rate	219, 220210, 3142, 3603, 618		BREATHS_PER_MIN	7904015
Respiratory rate spont @BREATHS_PER_MIN	Spont Resp rate, Spont RR, Respiratory Rate (spontaneous), Resp Rate (Spont), Spon RR (Mech.), Spont. Resp. Rate	1884, 224422, 224689, 614, 651, 653		null, BPM, BREATHS_PER_MIN	714134

Table 9: List of input features used in the model.

Harmonized Name	Display Names	MIMIC code	LOINC code	Units	Count
Respiratory rate total @BPM	Respiratory Rate (Total), Resp Rate (Total)	224690, 615		BREATHS_PER_MIN, BPM	812342
Rrt output @ML	Ultrafiltrate Output, Ultrafiltrate Ultrafiltrate, dialysis output, dialysis out, Dialysis out, DIALYSIS OUT, dialysis, DIALYSIS, Dialysis, PD dialysate out, Dialysis Out, dialysate out, Dialysis output, ULTRAFILTRATE, ultrafiltrate in, peritoneal dialysis, ultrafiltrate, ultrafiltrate out	226457, 40286, 40425, 40426, 40507, 40613, 40624, 40690, 40745, 40789, 41374, 41623, 42536, 43703, 44349, 44843, 44890, 46622		ML, null	123788
Sodium @MEQ_PER_L	Sodium, Sodium (serum), Sodium (whole blood), Sodium (135-148), Sodium, Whole Blood, Sodium (135-148)	1536, 220645, 226534, 3803, 50824, 50983, 837	2947-0, 2951-2	MEQ_PER_L, null	1000050
Svo2 @PERCENT	SVO2, SvO2, Mixed Venous O2% Sat, svo2, Swan SVO2, SV02, svo2 RIJ	2194, 223772, 225674, 2669, 664, 7361, 8186, 823, 838		PERCENT	250574
Tbili @MG_PER_DL	Total Bili, Total Bilirubin, Bilirubin, Total, Total Bili (0-1.5)	1538, 225690, 50885, 848	1975-2	MG_PER_DL, null	263182
Tco2 @MEQ_PER_L	TCO2 (21-30), Calculated Total CO2	3808, 50804	34728-6	null, MEQ_PER_L	490499
Temperature @CEL	Temperature Fahrenheit, Temperature Celsius, Temp Axillary [F], Temp Rectal [F], Temperature C, Temperature F	223761, 223762, 3652, 3654, 676, 678		CEL	2203935
Troponin t @NG_PER_ML	Troponin-T, Troponin T	227429, 51003	6598-7	NG_PER_ML	79888
Urine output @ML	Void, OR Urine, PACU Urine, Drainage Bag, OR Out OR Urine, OR Out PACU Urine, Urine Out Void, Urine Out Incontinent, PACU Out PACU Urine, Urine Out Other, ER URINE, TRUE URINE, Urine ., Dialysis indwelling, True Urine	226560, 226627, 226631, 227701, 40061, 40065, 40069, 40085, 40288, 40405, 42001, 42507, 43175, 44286, 45927		ML, null	252169
Urine output foley @ML	Foley, Urine Out Foley	226559, 40055		ML, null	3093578
Vt obs @ML_PER_BREATH	Tidal Volume (observed), tidal volumes, tidal vol, tidal volume, Tidal Volume, Tidal Volume (Obser)	224685, 2400, 2408, 2534, 681, 682		ML_PER_BREATH	701861

Table 9: List of input features used in the model.

Harmonized Name	Display Names	MIMIC code	LOINC code	Units	Count
Vt spont @ML_PER_BREATH	Spont Vt, Tidal Volume (spontaneous), svt, Spontaneous VT, spontaneous VT, spont tidal volumes, spont Tidal volumes, spont Vt's, Spon. Vt (L) (Mech.), Spont. Tidal Volume, Tidal Volume (Spont)	224421, 224686, 2553, 2566, 3004, 3050, 3083, 3086, 652, 654, 684		ML_PER_BREATH, null	494654
Wbc count @K_PER_UL	WBC (4-11,000), WBC, WBC 4.0-11.0, White Blood Cells, WBC (4-11,000)	1127, 1542, 220546, 4200, 51301, 861	804-5	K_PER_UL, null	842129
Weight @KG	Daily Weight	224639, 763		KG	93386