**S5 Table. Summary of important features derived from postoperative models predicting acute kidney injury occurring within the seven days after surgery.**

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| --- | --- |
| Postoperative stacked model  | Postoperative full model  |
| Rank | Variable | Feature importance score from Random Forest | Rank | Variable | Feature importance score from Random Forest |
| 1 | Risk probability for AKI from preoperative model | 0.40006  | 1  | Zip code | 0.21769  |
| 2 | Lactic acid - mean | 0.03299  | 2  | Chronic kidney disease | 0.05737  |
| 3 | Lactic acid - maximum | 0.03215  | 3  | Attending Surgeon | 0.04138  |
| 4 | Total blood products in ml | 0.02229  | 4  | Lactic acid - mean | 0.03581  |
| 5 | Red cell distribution width - mean | 0.01548  | 5  | Lactic acid - maximum | 0.03509  |
| 6 | Diastolic BP - time spent between 26 and 43 mmHg | 0.01499  | 6  | Total blood products in ml | 0.03003  |
| 7 | Diastolic BP - time spent between 43 and 51 mmHg | 0.01341  | 7  | Red cell distribution width - mean | 0.02013  |
| 8 | Red cell distribution width - maximum | 0.01258  | 8  | Red cell distribution width - maximum | 0.01690  |
| 9 | Platelet count - minimum | 0.01203  | 9  | Diastolic BP - time spent between 26 and 43 mmHg | 0.01404  |
| 10 | Diastolic BP - % time spent between 26 and 43 mmHg | 0.01198  | 10  | Red cell distribution width - minimum | 0.01398  |
| 11 | Platelet count - mean | 0.01086  | 11  | Age | 0.01336  |
| 12 | Red cell distribution width - minimum | 0.00976  | 12  | Diastolic BP - time spent between 43 and 51 mmHg | 0.01274  |
| 13 | Mean Arterial BP - time spent between 75 and 91 mmHg | 0.00936  | 13  | Diastolic BP - % time spent between 26 and 43 mmHg | 0.01116  |
| 14 | Platelet count - maximum | 0.00886  | 14  | Time of surgery from admission (days) | 0.01056  |
| 15 | Systolic BP - time spent between 75 and 91 mmHg | 0.00831  | 15  | Platelet count - mean | 0.01015  |
| 16 | Lactic acid - minimum | 0.00807  | 16  | Platelet count - minimum | 0.00994  |
| 17 | Systolic BP - time spent between 67 and 75 mmHg | 0.00796  | 17  | Mean Arterial BP - time spent between 75 and 91 mmHg | 0.00865  |
| 18 | Heart rate - time spent between 104 and 127 mmHg | 0.00785  | 18  | Lactic acid - minimum | 0.00824  |
| 19 | Total surgery time in mins | 0.00773  | 19  | Diastolic BP - base signal mean | 0.00775  |
| 20 | Heart rate - % time spent between 59 and 70 mmHg | 0.00762  | 20  | Diastolic BP - % time spent between 67 and 75 mmHg | 0.00767  |
| 21 | Heart rate - long-term variability | 0.00750  | 21  | Platelet count - maximum | 0.00733  |
| 22 | Heart rate - % time spent between 59 and 104 mmHg | 0.00724  | 22  | Bicarbonate in Arterial - min | 0.00723  |
| 23 | Diastolic BP - % time spent between 67 and 75 mmHg | 0.00692  | 23  | PaO2/FiO2 (PF) ratio | 0.00706  |
| 24 | Diastolic BP - % time spent between 75 and 91 mmHg | 0.00681  | 24  | Systolic BP - time spent between 75 and 91 mmHg | 0.00697  |
| 25 | Diastolic BP - base signal mean | 0.00677  | 25  | Charlson's comorbidity index  | 0.00687  |
| 26 | Diastolic BP - % time spent between 43 and 51 mmHg | 0.00658  | 26  | Distance from Residency to Hospital (km)  | 0.00655  |
| 27 | Diastolic BP - time spent between 67 and 75 mmHg | 0.00657  | 27  | Diastolic BP - % time spent between 43 and 51 mmHg | 0.00634  |
| 28 | Mean Platelet Volume - mean | 0.00651  | 28  | Systolic BP - time spent between 67 and 75 mmHg | 0.00602  |
| 29 | Diastolic BP - time spent between 75 and 91 mmHg | 0.00631  | 29  | Mean Arterial BP - time spent between 67 and 75 mmHg | 0.00519  |
| 30 | Heart rate - time spent between 93 and 104 bpm | 0.00606  | 30  | Diastolic BP - % time spent between 75 and 91 mmHg | 0.00512  |
| 31 | Diastolic BP - short-term variability  | 0.00601  | 31  | Partial pressure of carbon dioxide - mean | 0.00503  |
| 32 | MAC - time spent <= 1.478 | 0.00586  | 32  | Total surgery time in mins | 0.00501  |
| 33 | Carboxyhemoglobin in arterial - maximum | 0.00580  | 33  | Diastolic BP - time spent between 67 and 75 mmHg | 0.00480  |
| 34 | Heart rate - short-term variability | 0.00574  | 34  | Partial pressure of carbon dioxide - maximum | 0.00476  |
| 35 | Carboxyhemoglobin in arterial - mean | 0.00570  | 35  | Systolic BP - time spent between 43 and 75 mmHg | 0.00470  |
| 36 | Mean Arterial BP - time spent between 67 and 75 mmHg | 0.00561  | 36  | Systolic BP - % time spent between 51 and 67 mmHg | 0.00468  |
| 37 | Heart rate - time spent > 127 | 0.00557  | 37  | Heart rate - maximum during the surgery | 0.00463  |
| 38 | MAC - % time spent <= 1.478 | 0.00555  | 38  | Heart rate - % time spent between 59 and 70 bpm | 0.00462  |
| 39 | Mean Arterial BP - time spent > 116 | 0.00551  | 39  | Mean Arterial BP - % time spent between 51 and 67 mmHg | 0.00452  |
| 40 | Mean Platelet Volume - maximum | 0.00547  | 40  | Heart rate - long-term variability | 0.00447  |
| 41 | Diastolic BP - long-term variability  | 0.00544  | 41  | Mean Platelet Volume - mean | 0.00442  |
| 42 | Mean Arterial BP - % time spent > 116 | 0.00543  | 42  | Mean Arterial BP - time spent between 43 and 75 mmHg | 0.00440  |
| 43 | Carboxyhemoglobin in arterial - minimum | 0.00535  | 43  | Systolic BP - % time spent between 43 and 75 mmHg | 0.00437  |
| 44 | MAC - duration in mins | 0.00530  | 44  | MAC - time spent <= 1.478 | 0.00435  |
| 45 | Heart rate - duration in bpm | 0.00500  | 45  | Total urine output in ml | 0.00431  |
| 46 | Mean Platelet Volume - minimum | 0.00496  | 46  | Mean Arterial BP - % time spent between 43 and 75 mmHg | 0.00430  |
| 47 | Diastolic BP - time spent between 51 and 67 mmHg | 0.00492  | 47  | Diastolic BP - time spent between 75 and 91 mmHg | 0.00422  |
| 48 | Systolic BP - short-term variability | 0.00490  | 48  | Primary insurance group | 0.00417  |
| 49 | Bicarbonate in Arterial - variance | 0.00488  | 49  | pH - mean | 0.00414  |
| 50 | Mean Arterial BP - short-term variability | 0.00483  | 50  | White blood cells - min | 0.00409  |
| 51 | Mean Arterial BP - long-term variability | 0.00483  | 51  | Heart rate - % time spent between 104 and 127 bpm | 0.00409  |
| 52 | Diastolic BP - % time spent > 91 mmHg | 0.00483  | 52  | Heart rate - time spent between 104 and 127 bpm | 0.00401  |
| 53 | Systolic BP - long-term variability  | 0.00473  | 53  | Mean Arterial BP - long-term variability | 0.00383  |
| 54 | Heart rate - minimum during the surgery | 0.00471  | 54  | MAC - % time spent <= 1.478 | 0.00381  |
| 55 | Diastolic BP - time spent between 43 and 75 mmHg | 0.00469  | 55  | Heart rate - % time spent between 70 and 93 bpm | 0.00371  |
| 56 | Methemoglobin - mean | 0.00460  | 56  | Heart rate - % time spent between 59 and 104 bpm | 0.00369  |
| 57 | Systolic BP - % time spent between 75 and 91 mmHg | 0.00447  | 57  | Mean Platelet Volume - maximum | 0.00369  |
| 58 | Mean Arterial BP - % time spent between 75 and 91 mmHg | 0.00434  | 58  | Red blood cells - minimum | 0.00368  |
| 59 | Mean Arterial BP - time spent between 43 and 75 mmHg | 0.00429  | 59  | Diastolic BP - % time spent between 51 and 67 mmHg | 0.00365  |
| 60 | Mean Arterial BP - minimum during the surgery | 0.00425  | 60  | Carboxyhemoglobin in arterial - minimum | 0.00364  |
| 61 | MAC - time spent between 0 and 1 | 0.00421  | 61  | Mean Arterial BP - time spent > 116 | 0.00360  |
| 62 | Systolic BP - time spent between 43 and 75 mmHg | 0.00412  | 62  | Mean Platelet Volume - minimum | 0.00359  |
| 63 | MAC - time spent between 0 and 1.1 | 0.00403  | 63  | Carboxyhemoglobin in arterial - maximum | 0.00354  |
| 64 | Systolic BP - minimum during the surgery | 0.00401  | 64  | Systolic BP - long-term variability  | 0.00353  |
| 65 | Systolic BP - base signal mean | 0.00400  | 65  | Diastolic BP - time spent between 43 and 75 mmHg | 0.00352  |
| 66 | Mean Arterial BP - base signal mean | 0.00396  | 66  | Carboxyhemoglobin in arterial - mean | 0.00351  |
| 67 | Mean Arterial BP - % time spent between 51 and 67 mmHg | 0.00391  | 67  | Mean Arterial BP - % time spent between 75 and 91 mmHg | 0.00350  |
| 68 | Systolic BP - % time spent between 51 and 67 mmHg | 0.00374  | 68  | Heart rate - base signal mean | 0.00344  |
| 69 | Mean Arterial BP - % time spent between 43 and 75 mmHg | 0.00373  | 69  | White blood cells - maximum | 0.00344  |
| 70 | Methemoglobin - max | 0.00363  | 70  | Heart rate - duration in bpm | 0.00343  |
| 71 | Systolic BP - % time spent between 43 and 75 mmHg | 0.00360  | 71  | Mean Arterial BP - % time spent > 116 | 0.00341  |
| 72 | Mean Arterial BP - % time spent between 67 and 75 mmHg | 0.00346  | 72  | White blood cells - mean | 0.00335  |
| 73 | Systolic BP - % time spent between 67 and 75 mmHg | 0.00330  | 73  | Heart rate - minimum during the surgery | 0.00326  |
| 74 | Lactic acid -variance | 0.00307  | 74  | Systolic BP - % time spent between 75 and 91 mmHg | 0.00325  |
| 75 | Methemoglobin - minimum | 0.00306  | 75  | pH - minimum | 0.00324  |
| 76 | Lactic acid - abnormal percentage | 0.00303  | 76  | MAC - duration in mins | 0.00319  |
| 77 | Diastolic BP - duration in mmHg | 0.00296  | 77  | Diastolic BP - short-term variability  | 0.00319  |
| 78 | Mean Arterial BP - duration in mmHg | 0.00295  | 78  | Mean Arterial BP - % time spent between 67 and 75 mmHg | 0.00317  |
| 79 | Systolic BP - Duration in mmHg | 0.00289  | 79  | Heart rate - short-term variability | 0.00316  |
| 80 | MAC - maximum during the surgery | 0.00286  | 80  | Heart rate - time spent between 36 and 59 bpm | 0.00314  |
| 81 | Diastolic BP - % time spent <= 26 mmHg | 0.00274  | 81  | O2 Content, Arterial - mean | 0.00313  |
| 82 | Mean corpuscular volume - variance | 0.00272  | 82  | Systolic BP - % time spent between 67 and 75 mmHg | 0.00310  |
| 83 | Hematocrit - variance | 0.00267  | 83  | Heart rate - % time spent > 127 | 0.00308  |
| 84 | Red blood cells - variance | 0.00262  | 84  | Mean Arterial BP - base signal mean | 0.00304  |
| 85 | Systolic BP - % time spent between 43 and 51 mmHg | 0.00252  | 85  | Mean Arterial BP - short-term variability | 0.00295  |
| 86 | Heart rate - % time spent <= 36 | 0.00248  | 86  | Diastolic BP - long-term variability  | 0.00293  |
| 87 | Diastolic BP - minimum during the surgery | 0.00247  | 87  | Systolic BP - % time spent > 163 mmHg | 0.00292  |
| 88 | Mean Arterial BP - % time spent between 43 and 51 mmHg | 0.00239  | 88  | Systolic BP - base signal mean | 0.00288  |
| 89 | Mean Arterial BP - time spent between 51 and 67 mmHg | 0.00232  | 89  | Month of admission | 0.00287  |
| 90 | Systolic BP - time spent between 51 and 67 mmHg | 0.00214  | 90  | MAC - % time spent between 0 and 1 | 0.00285  |
| 91 | Heart rate - time spent <= 36 | 0.00208  | 91  | Diastolic BP - time spent between 51 and 67 mmHg | 0.00285  |
| 92 | Diastolic BP - time spent <= 26 mmHg | 0.00206  | 92  | Heart rate - % time spent between 93 and 104 bpm | 0.00285  |
| 93 | Systolic BP - % time spent <= 45 mmHg | 0.00204  | 93  | Systolic BP - short-term variability | 0.00277  |
| 94 | Mean corpuscular hemoglobin concentration - abnormal percentage | 0.00198  | 94  | Hematocrit -minimum | 0.00275  |
| 95 | Hemoglobin - variance | 0.00196  | 95  | O2 Content, Arterial - minimum | 0.00275  |
| 96 | Systolic BP - % time spent between 26 and 43 mmHg | 0.00183  | 96  | Methemoglobin - mean | 0.00272  |
| 97 | Mean Arterial BP - % time spent between 26 and 43 mmHg | 0.00181  | 97  | Heart rate - time spent between 93 and 104 bpm | 0.00271  |
| 98 | Mean Arterial BP - time spent between 43 and 51 mmHg | 0.00179  | 98  | Bicarbonate in Arterial - variance | 0.00266  |
| 99 | Systolic BP - time spent between 43 and 51 mmHg | 0.00178  | 99  | MAC - % time spent between 0 and 1.1 | 0.00263  |
| 100 | Red cell distribution width - variance | 0.00164  | 100  | Lactic acid - abnormal percentage | 0.00259  |
| 101 | Systolic BP - time spent <= 45 mmHg | 0.00163  | 101  | Systolic BP - time spent between 51 and 67 mmHg | 0.00254  |
| 102 | MAC - long-term variability | 0.00161  | 102  | Diastolic BP - duration in mmHg | 0.00254  |
| 103 | Mean Arterial BP - time spent between 26 and 43 mmHg | 0.00114  | 103  | Systolic BP - minimum during the surgery | 0.00252  |
| 104 | Diuretic | 0.00111  | 104  | Systolic BP - Duration in mmHg | 0.00250  |
| 105 | Systolic BP - time spent between 26 and 43 mmHg | 0.00105  | 105  | Mean Arterial BP - minimum during the surgery | 0.00250  |
| 106 | Mean Platelet Volume - abnormal percentage | 0.00099  | 106  | Hemoglobin in arterial - mean | 0.00244  |
| 107 | Mean corpuscular volume - abnormal percentage | 0.00085  | 107  | Admission Source | 0.00242  |
| 108 | Mean Arterial BP - time spent <= 33 | 0.00065  | 108  | Mean Arterial BP - time spent between 51 and 67 mmHg | 0.00239  |
| 109 | Red cell distribution width - abnormal percentage | 0.00063  | 109  | MAC - time spent between 0 and 1.1 | 0.00235  |
| 110 | Pressors | 0.00061  | 110  | Diastolic BP - % time spent > 91 mmHg | 0.00235  |
|  |  |   | 111  | Hemoglobin in arterial - minimum | 0.00230  |
|  |  |   | 112  | MAC - time spent between 0 and 1 | 0.00229  |
|  |  |   | 113  | Diastolic BP - time spent > 91 mmHg | 0.00224  |
|  |  |   | 114  | Hemoglobin - minimum | 0.00220  |
|  |  |   | 115  | Lactic acid -variance | 0.00218  |
|  |  |   | 116  | Mean Arterial BP - duration in mmHg | 0.00216  |
|  |  |   | 117  | Heart rate - time spent > 127 | 0.00208  |
|  |  |   | 118  | Heart rate - % time spent <= 36 | 0.00198  |
|  |  |   | 119  | Diuretic | 0.00194  |
|  |  |   | 120  | Mean Arterial BP - % time spent between 43 and 51 mmHg | 0.00190  |
|  |  |   | 121  | Hematocrit whole blood - mean | 0.00181  |
|  |  |   | 122  | Mean corpuscular volume - variance | 0.00174  |
|  |  |   | 123  | Hematocrit - variance | 0.00172  |
|  |  |   | 124  | Methemoglobin - minimum | 0.00171  |
|  |  |   | 125  | Diastolic BP - % time spent <= 26 mmHg | 0.00170  |
|  |  |   | 126  | Hemoglobin - variance | 0.00165  |
|  |  |   | 127  | Red blood cells - variance | 0.00162  |
|  |  |   | 128  | Heart rate - time spent <= 36 | 0.00161  |
|  |  |   | 129  | Systolic BP - % time spent between 43 and 51 mmHg | 0.00160  |
|  |  |   | 130  | Red cell distribution width - variance | 0.00159  |
|  |  |   | 131  | Methemoglobin - max | 0.00156  |
|  |  |   | 132  | Hematocrit whole blood - minimum | 0.00154  |
|  |  |   | 133  | Diastolic BP - minimum during the surgery | 0.00154  |
|  |  |   | 134  | Mean Arterial BP - time spent between 43 and 51 mmHg | 0.00153  |
|  |  |   | 135  | County | 0.00153  |
|  |  |   | 136  | Systolic BP - time spent between 43 and 51 mmHg | 0.00152  |
|  |  |   | 137  | MAC - maximum during the surgery | 0.00140  |
|  |  |   | 138  | Systolic BP - % time spent <= 45 mmHg | 0.00138  |
|  |  |   | 139  | Mean corpuscular hemoglobin concentration - abnormal percentage | 0.00136  |
|  |  |   | 140  | Diastolic BP - time spent <= 26 mmHg | 0.00132  |
|  |  |   | 141  | Diastolic BP - maximum during the surgery | 0.00130  |
|  |  |   | 142  | Systolic BP - % time spent between 26 and 43 mmHg | 0.00126  |
|  |  |   | 143  | Mean Arterial BP - % time spent between 26 and 43 mmHg | 0.00125  |
|  |  |   | 144  | Systolic BP - time spent <= 45 mmHg | 0.00119  |
|  |  |   | 145  | MAC - long-term variability | 0.00112  |
|  |  |   | 146  | Admitting Service  | 0.00108  |
|  |  |   | 147  | Mean Platelet Volume - abnormal percentage | 0.00108  |
|  |  |   | 148  | Mean corpuscular hemoglobin - variance | 0.00093  |
|  |  |   | 149  | Admitting type (Medicine/Surgery) | 0.00087  |
|  |  |   | 150  | Admission Type (Emergent/Elective) | 0.00085  |
|  |  |   | 151  | Carboxyhemoglobin in arterial - variance | 0.00080  |
|  |  |   | 152  | Systolic BP - time spent between 26 and 43 mmHg | 0.00078  |
|  |  |   | 153  | Mean Arterial BP - time spent between 26 and 43 mmHg | 0.00076  |
|  |  |   | 154  | Mean corpuscular volume - abnormal percentage | 0.00069  |
|  |  |   | 155  | Red cell distribution width - abnormal percentage | 0.00065  |
|  |  |   | 156  | Carboxyhemoglobin in arterial - abnormal percentage | 0.00064  |
|  |  |   | 157  | Antiemetic on admission day | 0.00064  |
|  |  |   | 158  | Mean Arterial BP - time spent <= 33 | 0.00061  |
|  |  |   | 159  | Diuretics on admission day | 0.00048  |
|  |  |   | 160  | Bicarbonate on admission day | 0.00047  |
|  |  |   | 161  | White blood cells - abnormal percentage | 0.00044  |
|  |  |   | 162  | Gender | 0.00043  |
|  |  |   | 163  | Pressors | 0.00041  |
|  |  |   | 164  | Methemoglobin - count | 0.00040  |
|  |  |   | 165  | Hemoglobin in arterial - count | 0.00039  |
|  |  |   | 166  | Bicarbonate in Arterial - count | 0.00038  |
|  |  |   | 167  | O2 Content, Arterial - count | 0.00037  |
|  |  |   | 168  | Weekend admission | 0.00035  |
|  |  |   | 169  | pH - count | 0.00034  |
|  |  |   | 170  | Carboxyhemoglobin in arterial - count | 0.00033  |
|  |  |   | 171  | O2 saturation - count | 0.00033  |
|  |  |   | 172  | Statin on admission day | 0.00029  |
|  |  |   | 173  | Hemoglobin - abnormal percentage | 0.00027  |
|  |  |   | 174  | Is night surgery?  | 0.00026  |
|  |  |   | 175  | Partial pressure of carbon dioxide - count | 0.00025  |
|  |  |   | 176  | Red blood cells - abnormal percentage | 0.00021  |
|  |  |   | 177  | Pressors or inotropes on admission day | 0.00014  |
|  |  |   | 178  | MAC - short-term variability | 0.00008  |
|  |  |   | 179  | Angiotensin-Converting-Enzyme Inhibitors on admission day | 0.00004  |
|  |  |   | 180  | Methemoglobin - abnormal percentage | 0.00002  |

Abbreviations. BP, blood pressure; MAC, minimum alveolar concentration; AKI , acute kidney injury; O2, oxygen; PaO2, Partial pressure of oxygen; FIO2, Fraction of inspired oxygen.