**Table S-1.** Demographic variables and vital observations used as input variables for RNN model, along with the percent of episodes in each dataset with these measurements and the percent of timesteps with imputed values.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable Name** | **Training Set** | **Valid Set** | **Test Set** |
| % Episodes w.Measurement | % Imputed | % Episodes w. Measurement | % Imputed | % Episodes w. Measurement | % Imputed  |
| Age | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 |
| Gender | 100.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 |
| Abdominal Girth | 9.3 | 99.6 | 8.9 | 99.6 | 9.6 | 99.6 |
| Activity Level | 78.7 | 97.2 | 76.7 | 97.3 | 78.0 | 97.1 |
| Bladder pressure | 1.4 | 99.9 | 1.2 | 99.9 | 1.0 | 99.9 |
| Capillary Refill Delayed | 66.5 | 92.8 | 69.1 | 92.1 | 67.8 | 92.0 |
| Capillary Refill Rate | 99.8 | 79.5 | 99.8 | 79.2 | 99.8 | 79.0 |
| Central Venous Pressure | 15.7 | 93.8 | 15.6 | 93.6 | 16.0 | 93.4 |
| Cerebral Perfusion  Pressure | 4.7 | 98.0 | 4.6 | 98.3 | 4.3 | 98.3 |
| Diastolic Blood Pressure | 100.0 | 52.7 | 100.0 | 52.8 | 100.0 | 52.3 |
| EtCO2 | 35.3 | 76.4 | 37.0 | 75.2 | 34.5 | 76.9 |
| Extremity  Temperature Level | 100.0 | 78.9 | 100.0 | 78.6 | 100.0 | 78.3 |
| Eye Response Level | 100.0 | 78.0 | 100.0 | 77.6 | 100.0 | 77.2 |
| FLACC Pain Activity | 80.2 | 83.1 | 80.6 | 83.3 | 79.8 | 82.9 |
| FLACC Pain  Consolability | 80.2 | 83.1 | 80.6 | 83.3 | 79.8 | 83.0 |
| FLACC Pain Cry | 80.2 | 83.1 | 80.6 | 83.3 | 79.8 | 83.0 |
| FLACC Pain Face | 80.2 | 83.1 | 80.6 | 83.3 | 79.9 | 82.9 |
| FLACC Pain Intensity | 80.1 | 83.2 | 80.6 | 83.3 | 79.8 | 83.0 |
| FLACC Pain Legs | 80.2 | 83.1 | 80.6 | 83.3 | 79.8 | 82.9 |
| Foley Catheter Volume | 42.9 | 89.8 | 42.5 | 89.9 | 43.0 | 90.0 |
| Gastrostomy Tube Volume | 10.9 | 99.4 | 11.4 | 99.6 | 11.2 | 99.5 |
| Glasgow Coma Score | 100.0 | 78.1 | 100.0 | 77.8 | 100.0 | 77.4 |
| Head Circumference | 17.1 | 99.9 | 16.6 | 99.9 | 16.4 | 99.9 |
| Heart Rate | 100.0 | 41.9 | 100.0 | 40.9 | 100.0 | 40.9 |
| Height | 95.8 | 99.2 | 95.7 | 99.2 | 95.8 | 99.2 |
| Hemofiltration Fluid  Output | 2.2 | 98.5 | 2.3 | 98.4 | 2.0 | 98.5 |
| Intracranial Pressure | 4.9 | 97.2 | 4.9 | 97.7 | 4.7 | 97.5 |
| Left Pupil Size After Light | 97.5 | 87.4 | 98.0 | 87.1 | 98.3 | 86.4 |
| Left Pupil Size Before  Light | 98.4 | 86.4 | 98.5 | 86.1 | 99.2 | 85.5 |
| Left Pupillary Response Level | 98.7 | 85.9 | 98.8 | 85.7 | 99.3 | 85.1 |
| Level of Consciousness | 99.9 | 69.8 | 100.0 | 69.1 | 100.0 | 69.1 |
| Lip Moisture Level | 66.8 | 88.0 | 66.6 | 88.5 | 65.6 | 88.0 |
| Mean Arterial  Pressure | 100.0 | 53.0 | 100.0 | 53.2 | 100.0 | 52.6 |
| Motor Response Level | 100.0 | 78.0 | 100.0 | 77.6 | 100.0 | 77.2 |
| Nasal Flaring Level | 98.9 | 72.8 | 99.2 | 72.0 | 99.2 | 72.3 |
| Nutrition Level | 65.0 | 98.3 | 63.5 | 98.3 | 64.8 | 98.2 |
| Oxygenation Index | 10.6 | 99.5 | 10.0 | 99.4 | 10.2 | 99.5 |
| PaO2 to FiO2 | 11.6 | 99.3 | 11.0 | 99.3 | 11.2 | 99.4 |
| Patient Mood Level | 99.7 | 76.2 | 99.9 | 75.9 | 99.8 | 75.6 |
| Pulse Oximetry | 100.0 | 41.0 | 100.0 | 40.0 | 100.0 | 40.0 |
| Quality of Pain Level | 94.7 | 82.4 | 95.2 | 82.4 | 94.9 | 82.2 |
| Respiratory Effort  Level | 99.9 | 72.2 | 100.0 | 71.4 | 100.0 | 71.7 |
| Respiratory Rate | 100.0 | 42.0 | 100.0 | 41.0 | 100.0 | 41.1 |
| Right Pupil Size After  Light | 97.7 | 87.3 | 98.2 | 87.1 | 98.5 | 86.3 |
| Right Pupil Size  Before Light | 98.4 | 86.4 | 98.6 | 86.0 | 99.2 | 85.5 |
| Right Pupillary  Response Level | 98.7 | 85.9 | 98.9 | 85.6 | 99.3 | 85.1 |
| Sedation Scale Level | 40.8 | 98.3 | 40.7 | 98.4 | 40.5 | 98.3 |
| Skin Turgor\_edema | 12.0 | 97.8 | 11.7 | 97.7 | 11.4 | 98.0 |
| Skin Turgor\_turgor | 99.1 | 82.2 | 99.1 | 82.1 | 99.2 | 81.5 |
| Systolic Blood  Pressure | 100.0 | 52.7 | 100.0 | 52.8 | 100.0 | 52.3 |
| Temperature | 99.8 | 84.1 | 99.8 | 83.7 | 99.9 | 83.6 |
| Verbal Response  Level | 100.0 | 78.0 | 100.0 | 77.7 | 100.0 | 77.3 |
| WAT1 Total | 6.4 | 99.4 | 6.9 | 99.3 | 7.0 | 99.4 |
| Weight | 100.0 | 97.9 | 100.0 | 97.9 | 100.0 | 97.8 |

See Table S-5 for acronym expansions ().