**Title: Early critical care** **transthoracic echocardiography improves the mortality of patients undergoing mechanical ventilation: Observational data from two databases**

**Online Supplement**

Xueshu Yu1, Hao Jiang1, Wenjing Chen1, Lingling Pan1, Zhendong Fang1, Xianwei Zhang1, Zhiqing Chen1, Jie Shu1, Yincai Ye2, Jingye Pan1, \*

**eFig.1.** **Pattern of missing data in variables of interest in MIMIC–III database.**

**![图片包含 游戏机, 钟表

描述已自动生成]()**

**eFig.2. Pattern of missing data in variables of interest in eICU-CRD database.**

**![图片包含 游戏机, 钟表

描述已自动生成]()**

**eFig.3.** **Balancing the PSM model, the IPTW model and CBPS model in MIMIC.**

Both models showed that variables were already balanced.

**![地图的截图

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**eFig.4. Balancing the PSM model, the IPTW model and CBPS model in eICU-CRD.**

Both models showed that variables were already balanced.

**![地图的截图

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**eFig.5. The results of 30-day mortality.**

TTE was associated with 30-day mortality in MIMIC [OR 0.74, 95%CI (0.6-0.92), P=0.01]. eICU-CRD has no follow-up records outside the in-hospital.

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**eFig.6. MV patients with TTE during different time periods.**

Echo time I：patients who had TTE but the TTE time is not in the Echo time II; Echo time II: TTE time >= MV time+24 hour and TTE time<=MV time+24 hour. The results showed that Patients who had echocardiography performed less than 24 h before their mechanical ventilation or 24 h after their mechanical ventilation was beneficial to improve the in-hospital mortality of patients with mechanical ventilation [MIMIC: OR 0.59, 95%CI(0.44-0.79),P<0.001; eICU: OR 0.5 (0.43-0.59), P<0.001].

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**eTable.1.** **Baseline Characteristics of original cohort.** The data was divided into survivor cohort and death cohort.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variables | MIMIC cohort | | | eICU-CRD cohort | | |
| Survivor | Death | P value | Survivor | Death | P value |
| N | 1894 | 896 |  | 4327 | 1745 |  |
| Sex (%) |  |  |  |  |  | 0.475 |
| F | 929 (49.0) | 417 (46.5) | 0.231 | 1926 (44.5) | 795 (45.6) |  |
| M | 965 (51.0) | 479 (53.5) |  | 2401 (55.5) | 950 (54.4) |  |
| Age (mean (SD)) | 59.98 (16.17) | 66.16 (15.30) | <0.001 | 60.91 (15.78) | 65.07 (14.92) | <0.001 |
| Race (%) |  |  |  |  |  | <0.001 |
| Black | 175 (9.2) | 55 (6.1) | <0.001 | 477 (11.0) | 125 (7.2) |  |
| Hispanic | 60 (3.2) | 17 (1.9) |  | 103 (2.4) | 44 (2.5) |  |
| Other | 347 (18.3) | 233 (26.0) |  | 249 (5.8) | 112 (6.4) |  |
| White | 1312 (69.3) | 591 (66.0) |  | 3498 (80.8) | 1464 (83.9) |  |
| Weight (mean (SD)) | 81.28 (21.03) | 76.79 (20.03) | <0.001 | 83.74 (22.69) | 81.83 (23.02) | 0.004 |
| HR (mean (SD)) | 91.35 (17.69) | 91.34 (18.04) | 0.983 | 93.99 (17.17) | 95.61 (17.70) | 0.001 |
| MAP (mean (SD)) | 79.42 (11.17) | 77.91 (11.83) | 0.001 | 82.19 (12.27) | 80.33 (12.74) | <0.001 |
| COPD (%) |  |  |  |  |  | 0.524 |
| 0 | 1777 (93.8) | 840 (93.8) | 1 | 3378 (78.1) | 1376 (78.9) |  |
| 1 | 117 (6.2) | 56 (6.2) |  | 949 (21.9) | 369 (21.1) |  |
| Asthma (%) |  |  |  |  |  | 0.214 |
| 0 | 1731 (91.4) | 850 (94.9) | 0.001 | 4243 (98.1) | 1719 (98.6) |  |
| 1 | 163 (8.6) | 46 (5.1) |  | 84 (1.9) | 25 (1.4) |  |
| SOFA (mean (SD)) | 6.11 (3.69) | 7.36 (4.44) | <0.001 | 5.70 (3.33) | 7.47 (3.77) | <0.001 |
| OASIS (mean (SD)) | 38.07 (8.09) | 41.12 (7.85) | <0.001 | 32.04 (10.21) | 35.81 (10.49) | <0.001 |
| Hb (mean (SD)) | 10.92 (2.09) | 10.68 (2.13) | 0.005 | 11.82 (2.71) | 11.39 (2.64) | <0.001 |
| WBC (mean (SD)) | 12.11 (5.94) | 12.42 (6.35) | 0.235 | 12.75 (6.00) | 12.72 (6.23) | 0.889 |
| pH (mean (SD)) | 7.35 (0.11) | 7.34 (0.12) | 0.387 | 7.33 (0.11) | 7.32 (0.13) | 0.014 |
| BUN (mean (SD)) | 29.01 (24.36) | 35.30 (26.86) | <0.001 | 28.55 (23.72) | 32.69 (25.58) | <0.001 |
| pO2 (mean (SD)) | 137.37 (79.51) | 136.48 (79.79) | 0.799 | 120.04 (71.38) | 119.06 (73.53) | 0.687 |
| pCO2 (mean (SD)) | 40.98 (9.44) | 39.41 (10.50) | <0.001 | 43.26 (12.96) | 42.27 (13.08) | 0.023 |
| Lactate (mean (SD)) | 2.11 (1.20) | 2.26 (1.23) | 0.012 | 2.92 (2.64) | 3.93 (3.53) | <0.001 |

**eTable.2. Baseline characteristics comparing the PSM cohort, the IPTW cohort and the CBPS cohort (MIMIC)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | PSM cohort | | | IPTW cohort | | | CBPS cohort | | |
| **Non-TTE** | **TTE** | **SMD** | **Non-TTE** | **TTE** | **SMD** | **Non-TTE** | **TTE** | **SMD** |
| N | 859 | 859 |  | 2800.1 | 2772.6 |  | 858 | 858 |  |
| Sex (%) |  |  |  |  |  |  |  |  | 0.005 |
| F | 429 (49.9) | 414 (48.2) | 0.035 | 1358.9 (48.5) | 1366.2 (49.3) | 0.015 | 415 (48.4) | 413 (48.1) |  |
| M | 430 (50.1) | 445 (51.8) |  | 1441.2 (51.5) | 1406.4 (50.7) |  | 443 (51.6) | 445 (51.9) |  |
| Age (mean (SD)) | 62.39 (15.39) | 62.33 (16.42) | 0.004 | 62.21 (15.59) | 62.01 (16.63) | 0.013 | 62.66 (15.53) | 62.29 (16.46) | 0.023 |
| Race (%) |  |  |  |  |  |  |  |  | 0.031 |
| Black | 77 (9.0) | 72 (8.4) | 0.028 | 232.2 (8.3) | 239.3 (8.6) | 0.017 | 70 (8.2) | 72 (8.4) |  |
| Hispanic | 24 (2.8) | 25 (2.9) |  | 77.7 (2.8) | 81.3 (2.9) |  | 28 (3.3) | 24 (2.8) |  |
| Other | 167 (19.4) | 162 (18.9) |  | 586.1 (20.9) | 584.0 (21.1) |  | 157 (18.3) | 162 (18.9) |  |
| White | 591 (68.8) | 600 (69.8) |  | 1904.2 (68.0) | 1868.0 (67.4) |  | 603 (70.3) | 600 (69.9) |  |
| Weight (mean (SD)) | 81.16 (20.20) | 81.59 (20.93) | 0.021 | 80.18 (20.49) | 80.25 (20.92) | 0.003 | 82.40 (20.67) | 81.62 (20.92) | 0.037 |
| HR (mean (SD)) | 91.57 (17.96) | 92.35 (18.83) | 0.042 | 91.36 (17.46) | 91.12 (18.42) | 0.013 | 92.17 (17.07) | 92.31 (18.84) | 0.008 |
| MAP (mean (SD)) | 77.71 (10.75) | 77.82 (11.44) | 0.009 | 78.92 (11.28) | 78.97 (11.85) | 0.004 | 77.60 (11.10) | 77.83 (11.44) | 0.02 |
| COPD (%) |  |  |  |  |  |  |  |  | 0.005 |
| 0 | 801 (93.2) | 802 (93.4) | 0.005 | 2626.5 (93.8) | 2602.5 (93.9) | 0.003 | 802 (93.5) | 801 (93.4) |  |
| 1 | 58 (6.8) | 57 (6.6) |  | 173.7 (6.2) | 170.1 (6.1) |  | 56 (6.5) | 57 (6.6) |  |
| Asthma (%) |  |  |  |  |  |  |  |  | 0.017 |
| 0 | 789 (91.9) | 789 (91.9) | <0.001 | 2584.5 (92.3) | 2558.0 (92.3) | 0.001 | 791 (92.2) | 787 (91.7) |  |
| 1 | 70 (8.1) | 70 (8.1) |  | 215.6 (7.7) | 214.6 (7.7) |  | 67 (7.8) | 71 (8.3) |  |
| ARDS (%) |  |  |  |  |  |  |  |  | 0.009 |
| 0 | 725 (84.4) | 713 (83.0) | 0.038 | 2442.3 (87.2) | 2422.3 (87.4) | 0.004 | 711 (82.9) | 714 (83.2) |  |
| 1 | 134 (15.6) | 146 (17.0) |  | 357.9 (12.8) | 350.3 (12.6) |  | 147 (17.1) | 144 (16.8) |  |
| Sepsis (%) |  |  |  |  |  |  |  |  | 0.012 |
| 0 | 154 (17.9) | 173 (20.1) | 0.056 | 710.8 (25.4) | 674.6 (24.3) | 0.024 | 169 (19.7) | 173 (20.2) |  |
| 1 | 705 (82.1) | 686 (79.9) |  | 2089.4 (74.6) | 2098.1 (75.7) |  | 689 (80.3) | 685 (79.8) |  |
| SOFA (mean (SD)) | 7.55 (4.26) | 7.59 (3.92) | 0.011 | 6.58 (4.19) | 6.61 (3.86) | 0.007 | 7.55 (4.20) | 7.58 (3.91) | 0.007 |
| OASIS (mean (SD)) | 40.90 (7.84) | 40.82 (8.11) | 0.01 | 39.14 (8.26) | 39.09 (8.19) | 0.006 | 40.68 (8.08) | 40.80 (8.09) | 0.015 |
| Hb (mean (SD)) | 10.92 (2.15) | 10.90 (2.13) | 0.013 | 10.83 (2.08) | 10.79 (2.13) | 0.02 | 10.84 (2.11) | 10.90 (2.14) | 0.03 |
| WBC (mean (SD)) | 12.51 (6.25) | 12.54 (6.21) | 0.004 | 12.22 (5.91) | 12.12 (6.04) | 0.017 | 12.52 (6.04) | 12.55 (6.22) | 0.005 |
| BUN (mean (SD)) | 34.58 (27.24) | 33.92 (25.35) | 0.025 | 7.35 (0.11) | 7.35 (0.11) | 0.005 | 34.67 (27.28) | 33.91 (25.35) | 0.029 |
| pH (mean (SD)) | 7.33 (0.11) | 7.33 (0.12) | 0.009 | 31.26 (26.05) | 31.54 (24.15) | 0.011 | 7.33 (0.11) | 7.33 (0.12) | 0.006 |
| pO2 (mean (SD)) | 131.05 (68.65) | 130.39 (74.82) | 0.009 | 139.11 (73.02) | 140.38 (79.21) | 0.017 | 128.27 (67.16) | 130.60 (74.81) | 0.033 |
| pCO2 (mean (SD)) | 41.02 (9.73) | 40.91 (10.01) | 0.012 | 40.75 (9.27) | 40.66 (9.63) | 0.01 | 41.14 (9.74) | 40.91 (9.97) | 0.023 |
| Lactate (mean (SD)) | 2.22 (1.09) | 2.24 (1.12) | 0.016 | 2.13 (1.01) | 2.12 (1.04) | 0.011 | 2.23 (1.08) | 2.24 (1.12) | 0.005 |

**eTable.3. Baseline characteristics comparing the PSM cohort, the IPTW cohort and the CBPS cohort (eICU-CRD).**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | PSM cohort | | | IPTW cohort | | | CBPS cohort | | |
| **no-TTE** | **TTE** | **SMD** | **no-TTE** | **TTE** | **SMD** | **no-TTE** | **TTE** | **SMD** |
| N | 2041 | 2041 |  | 6071 | 6078.2 |  | 2044 | 2044 |  |
| Sex (%) |  |  |  |  |  |  |  |  | 0.006 |
| Female | 954 (46.7) | 951 (46.6) | 0.003 | 2721.0 (44.8) | 2719.7 (44.7) | 0.002 | 947 (46.3) | 953 (46.6) |  |
| Male | 1087 (53.3) | 1090 (53.4) |  | 3350.0 (55.2) | 3358.5 (55.3) |  | 1097 (53.7) | 1091 (53.4) |  |
| Age (mean (SD)) | 61.83 (15.65) | 61.76 (15.83) | 0.005 | 62.03 (15.49) | 62.43 (15.90) | 0.025 | 61.82 (15.55) | 61.77 (15.82) | 0.004 |
| Race (%) |  |  |  |  |  |  |  |  | 0.039 |
| Black | 222 (10.9) | 212 (10.4) | 0.032 | 605.6 (10.0) | 614.0 (10.1) | 0.021 | 205 (10.0) | 212 (10.4) |  |
| Hispanic | 28 (1.4) | 34 (1.7) |  | 145.8 (2.4) | 127.5 (2.1) |  | 27 (1.3) | 34 (1.7) |  |
| Other | 135 (6.6) | 143 (7.0) |  | 360.9 (5.9) | 359.0 (5.9) |  | 133 (6.5) | 144 (7.0) |  |
| White | 1656 (81.1) | 1652 (80.9) |  | 4958.7 (81.7) | 4977.7 (81.9) |  | 1679 (82.1) | 1654 (80.9) |  |
| Weight (mean (SD)) | 83.16 (22.66) | 83.25 (22.76) | 0.004 | 83.41 (22.15) | 83.22 (22.72) | 0.009 | 83.40 (22.18) | 83.24 (22.75) | 0.007 |
| HR (mean (SD)) | 93.98 (17.35) | 93.93 (17.13) | 0.003 | 94.50 (17.30) | 94.66 (17.11) | 0.009 | 93.65 (17.08) | 93.94 (17.13) | 0.017 |
| MAP (mean (SD)) | 82.53 (12.29) | 82.42 (12.35) | 0.009 | 81.65 (12.16) | 81.43 (12.27) | 0.018 | 82.33 (12.18) | 82.42 (12.34) | 0.008 |
| COPD (%) |  |  |  |  |  |  |  |  |  |
| 0 | 1556 (76.2) | 1544 (75.6) | 0.014 | 4754.3 (78.3) | 4741.1 (78.0) | 0.008 | 1553 (76.0) | 1545 (75.6) | 0.009 |
| 1 | 485 (23.8) | 497 (24.4) |  | 1316.6 (21.7) | 1337.1 (22.0) |  | 491 (24.0) | 499 (24.4) |  |
| Asthma (%) |  |  |  |  |  |  |  |  |  |
| 0 | 2022 (99.10) | 2018 (98.9) | 0.019 | 5962.5 (98.2) | 5978.4 (98.4) | 0.011 | 2023 (99.0) | 2021 (98.9) | 0.009 |
| 1 | 19 (0.90) | 23 (1.1) |  | 108.5 (1.8) | 99.8 (1.6) |  | 21 (1.0) | 23 (1.1) |  |
| ARDS (%) |  |  |  |  |  |  |  |  |  |
| 0 | 1854 (90.8) | 1851 (90.7) | 0.005 | 5396.0 (88.9) | 5393.4 (88.7) | 0.005 | 1844 (90.2) | 1854 (90.7) | 0.017 |
| 1 | 187 (9.2) | 190 (9.3) |  | 674.9 (11.1) | 684.8 (11.3) |  | 200 (9.8) | 190 (9.3) |  |
| Sepsis (%) |  |  |  |  |  |  |  |  |  |
| 0 | 1807 (88.5) | 1807 (88.5) | <0.001 | 4574.4 (75.3) | 4568.6 (75.2) | 0.004 | 1813 (88.7) | 1810 (88.6) | 0.005 |
| 1 | 234 (11.5) | 234 (11.5) |  | 1496.6 (24.7) | 1509.6 (24.8) |  | 231 (11.3) | 234 (11.4) |  |
| SOFA (mean (SD)) | 6.03 (3.57) | 6.05 (3.37) | 0.007 | 6.20 (3.63) | 6.16 (3.43) | 0.011 | 6.04 (3.60) | 6.06 (3.38) | 0.004 |
| OASIS (mean (SD)) | 32.82 (10.32) | 32.79 (10.50) | 0.003 | 33.09 (10.38) | 33.08 (10.63) | 0.001 | 32.79 (10.19) | 32.78 (10.52) | 0.001 |
| HB (mean (SD)) | 11.60 (2.68) | 11.57 (2.67) | 0.01 | 11.69 (2.69) | 11.70 (2.69) | 0.004 | 11.60 (2.67) | 11.57 (2.66) | 0.009 |
| WBC (mean (SD)) | 12.67 (5.74) | 12.73 (5.89) | 0.01 | 12.75 (5.88) | 12.75 (5.94) | <0.001 | 12.72 (5.86) | 12.74 (5.89) | 0.003 |
| pH (mean (SD)) | 7.34 (0.10) | 7.34 (0.10) | 0.02 | 7.33 (0.10) | 7.33 (0.10) | 0.004 | 7.34 (0.10) | 7.34 (0.10) | 0.02 |
| BUN (mean (SD)) | 28.96 (23.60) | 29.06 (23.52) | 0.004 | 29.69 (24.38) | 29.74 (23.24) | 0.002 | 28.81 (23.67) | 29.06 (23.51) | 0.011 |
| pO2 (mean (SD)) | 123.33 (62.26) | 121.83 (59.78) | 0.025 | 121.58 (62.29) | 121.33 (60.53) | 0.004 | 120.98 (61.98) | 121.79 (59.75) | 0.013 |
| pCO2 (mean (SD)) | 43.48 (11.29) | 43.77 (11.71) | 0.025 | 43.52 (11.53) | 43.56 (11.85) | 0.003 | 43.77 (11.52) | 43.78 (11.71) | 0.001 |
| Lactate (mean (SD)) | 2.87 (2.28) | 2.88 (2.38) | 0.005 | 3.03 (2.47) | 3.03 (2.62) | 0.003 | 2.82 (2.22) | 2.88 (2.38) | 0.025 |

**eTable.4.** **The cohort of ARDS patients and sepsis patients.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | MIMIC cohort | | | | eICU-CRD cohort | | | |
| ARDS group | | Sepsis group | | ARDS group | | Sepsis group | |
| **no-TTE** | **TTE** | **no-TTE** | **TTE** | **no-TTE** | **TTE** | **no-TTE** | **TTE** |
| N | 202 | 151 | 1377 | 694 | 485 | 190 | 1262 | 234 |
| In-hospital mortality (%) |  |  |  |  |  |  |  |  |
| 0 | 133 (65.8) | 114 (75.5) | 928 (67.4) | 505 (72.8) | 318 (65.6) | 143 (75.3) | 818 (64.8) | 170 (72.6) |
| 1 | 69 (34.2) | 37 (24.5) | 449 (32.6) | 189 (27.2) | 167 (34.4) | 47 (24.7) | 444 (35.2) | 64 (27.4) |
| Sex (%) |  |  |  |  |  |  |  |  |
| Female | 95 (47.0) | 72 (47.7) | 679 (49.3) | 326 (47.0) | 232 (47.8) | 94 (49.5) | 581 (46) | 113 (48.3) |
| Male | 107 (53.0) | 79 (52.3) | 698 (50.7) | 368 (53.0) | 253 (52.2) | 96 (50.5) | 681 (54) | 121 (51.7) |
| Age (mean (SD)) | 60.20 (16.10) | 56.47 (17.57) | 62.20 (15.52) | 62.64 (15.72) | 62.39 (14.84) | 61.81 (14.28) | 63.07 (14.56) | 65.51 (15.3) |
| Race (%) |  |  |  |  |  |  |  |  |
| Black | 9 (4.5) | 12 (7.9) | 115 (8.4) | 56 (8.1) | 52 (10.7) | 17 (8.9) | 106 (8.4) | 21 (9.0) |
| Hispanic | 7 (3.5) | 6 (4) | 31 (2.3) | 22 (3.2) | 14 (2.9) | 2 (1.1) | 35 (2.8) | 2 (0.9) |
| Other | 55 (27.2) | 31 (20.5) | 291 (21.1) | 130 (18.7) | 27 (5.6) | 23 (12.1) | 68 (5.4) | 21 (9) |
| White | 131 (64.9) | 102 (67.5) | 940 (68.3) | 486 (70) | 392 (80.8) | 148 (77.9) | 1053 (83.4) | 190 (81.2) |
| Weight (mean (SD)) | 79.60 (18.41) | 80.53 (17.78) | 79.86 (20.46) | 82.35 (21.40) | 82.50 (22.44) | 84.87 (24.16) | 83.09 (22.61) | 80.75 (22.72) |
| HR (mean (SD)) | 94.23 (17.1) | 97.30 (18.69) | 91.84 (17.35) | 93.13 (18.92) | 96.53 (17.17) | 95.91 (17.49) | 98.66 (16.99) | 100.03 (16.40) |
| MAP (mean (SD)) | 77.93 (10.94) | 75.59 (9.42) | 78.29 (10.96) | 77.02 (11.39) | 79.86 (11.47) | 81.20 (11.85) | 78.85 (11.25) | 77.53 (11.21) |
| COPD (%) |  |  |  |  |  |  |  |  |
| 0 | 189 (93.6) | 144 (95.4) | 1269 (92.2) | 637 (91.8) | 382 (78.8) | 139 (73.2) | 1004 (79.6) | 176 (75.2) |
| 1 | 13 (6.4) | 7 (4.6) | 108 (7.8) | 57 (8.2) | 103 (21.2) | 51 (26.8) | 258 (20.4) | 58 (24.8) |
| Asthma (%) |  |  |  |  |  |  |  |  |
| 0 | 186 (92.1) | 142 (94.0) | 1282 (93.1) | 633 (91.2) | 474 (97.7) | 185 (97.4) | 1235 (97.9) | 232 (99.1) |
| 1 | 16 (7.9) | 9 (6.0) | 95 (6.9) | 61 (8.8) | 11 (2.3) | 5 (2.6) | 27 (2.1) | 2 (0.9) |
| SOFA (mean (SD)) | 7.29 (3.78) | 8.44 (3.60) | 6.47 (3.99) | 7.85 (3.95) | 6.40 (3.91) | 5.69 (3.2) | 7.13 (3.74) | 6.56 (3.68) |
| OASIS (mean (SD)) | 38.65 (8.69) | 40.83 (7.27) | 38.75 (8.03) | 41.14 (8.24) | 33.68 (10.16) | 32.07 (10.86) | 33.97 (10.97) | 32.94 (11.85) |
| HB (mean (SD)) | 10.45 (2.07) | 10.82 (1.99) | 10.69 (2.07) | 10.85 (2.10) | 11.40 (2.58) | 11.31 (2.93) | 11.44 (2.65) | 11.37 (2.68) |
| WBC (mean (SD)) | 12.25 (6.69) | 13.07 (6.39) | 12.10 (5.95) | 12.48 (6.18) | 12.68 (6.27) | 12.48 (5.54) | 13.43 (6.59) | 13.97 (6.46) |
| pH (mean (SD)) | 7.34 (0.1) | 7.31 (0.12) | 7.35 (0.1) | 7.32 (0.12) | 7.33 (0.11) | 7.34 (0.10) | 7.33 (0.11) | 7.33 (0.10) |
| BUN (mean (SD)) | 32.55 (26.15) | 32.66 (24.32) | 32.25 (26.85) | 35.45 (26.13) | 31.77 (25.66) | 31.16 (23.8) | 35.71 (27.99) | 35.36 (24.21) |
| pO2 (mean (SD)) | 132.40 (78.7) | 114.21 (71.23) | 137.79 (73.44) | 127.66 (73.44) | 105.26 (58.57) | 110.04 (56.87) | 114.64 (58.63) | 112.19 (58.41) |
| pCO2 (mean (SD)) | 41.97 (9.25) | 41.34 (9.46) | 40.96 (9.17) | 40.99 (10.14) | 44.36 (11.96) | 45.32 (11.17) | 41.54 (11.48) | 41.97 (12.08) |
| Lactate (mean (SD)) | 2.02 (0.99) | 2.29 (1.27) | 2.10 (1.01) | 2.25 (1.14) | 2.82(2.31) | 2.37(1.82) | 3.32(2.76) | 3.15(2.7) |

**eTable.5. The results of subgroup analysis.**

The results showed that early TTE was also beneficial in improving the in-hospital mortality in ARDS cohort (in MIMIC only) and sepsis cohort.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subgroup | MIMIC |  | eICU |  |
|  | adjusted OR (95%CI) | P value | adjusted OR (95%CI) | P value |
| ALL patient | 0.687(0.523-0.899) | 0.007 | 0.757(0.664-0.862) | <0.001 |
| ARDS cohort | 0.516(0.291-0.899) | 0.021 | 0.717(0.467-1.089) | 0.12 |
| Sepsis cohort | 0.648(0.520-0.806) | <0.001 | 0.646(0.463-0.891) | 0.01 |

**eTable.6. The cohort of patients with transthoracic echocardiography (TTE) between the time of ICU admission and the end time of mechanical ventilation (MV).** Echo time I：patients who had TTE but the TTE time is not in the Echo time II; Echo time II: TTE time >= MV time+24 hour and TTE<=MV time+24 hour.

|  |  |  |
| --- | --- | --- |
| Variables | **MIMIC cohort** | **eICU cohort** |
| N | 1206 | 3900 |
| In-hospital mortality (%) |  |  |
| 0 | 815 (67.6) | 2675 (68.6) |
| 1 | 391 (32.4) | 1225 (31.4) |
| Echo time (%) |  |  |
| I | 338 (28.0) | 1842 (47.2) |
| II | 868 (72.0) | 2058 (52.8) |
| Sex (%) |  |  |
| Female | 578 (47.9) | 1760 (45.1) |
| Male | 628 (52.1) | 2140 (54.9) |
| Age (mean (SD)) | 62.18 (16.08) | 62.08 (15.49) |
| Race (%) |  |  |
| Black | 98 (8.1) | 370 (9.5) |
| Hispanic | 33 (2.7) | 80 (2.1) |
| Other | 238 (19.7) | 266 (6.8) |
| White | 837 (69.4) | 3184 (81.6) |
| Weight (mean (SD)) | 81.47 (20.90) | 83.58 (22.55) |
| HR (mean (SD)) | 92.08 (18.24) | 94.54 (17.16) |
| MAP (mean (SD)) | 77.92 (11.30) | 81.90 (12.28) |
| COPD (%) |  |  |
| 0 | 1121 (93) | 3000 (76.9) |
| 1 | 85 (7) | 900 (23.1) |
| Asthma (%) |  |  |
| 0 | 1104 (91.5) | 3838 (98.4) |
| 1 | 102 (8.5) | 62 (1.6) |
| ARDS (%) |  |  |
| 0 | 1010 (83.7) | 3509 (90.0) |
| 1 | 196 (16.3) | 391 (10.0) |
| Sepsis (%) |  |  |
| 0 | 228 (18.9) | 3089 (79.2) |
| 1 | 978 (81.1) | 811 (20.8) |
| SOFA (mean (SD)) | 7.31 (3.99) | 6.15 (3.51) |
| OASIS (mean (SD)) | 40.11 (8.34) | 32.68 (10.60) |
| HB (mean (SD)) | 10.84 (2.16) | 11.61 (2.67) |
| WBC (mean (SD)) | 12.39 (6.08) | 12.83 (5.93) |
| pH (mean (SD)) | 7.33 (0.11) | 7.33 (0.10) |
| BUN (mean (SD)) | 34.03 (25.93) | 29.55 (24.35) |
| pO2 (mean (SD)) | 131.10 (73.72) | 121.16 (60.70) | |
| pCO2 (mean (SD)) | 40.99 (9.97) | 43.59 (11.66) |
| Lactate (mean (SD)) | 2.19 (1.08) | 2.99 (2.52) |

**eTable.7. Secondary outcome analysis with propensity score matched cohorts.**

The results showed that those who had TTE both had longer ventilation-free day (MIMIC:P=0.03; eICU:P<0.001) and longer vasopressor-free day (MIMIC: P=0.01; eICU: P<0.001) in 30 days than no TTE group, and this might be related to the managements changes brought by TTE, include the amount of IV fluid(only in eICU-CRD, P<0.001), the use of vasoactive drugs (both in MIMIC and eICU) and the setting of ventilator parameters (only in MIMIC).

PEEP positive end expiratory pressure, VT Tidal volume, Pplat plateau pressure, MP Mechanical power.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Managements | MIMIC cohort | | P value | eICU cohort | | P value |
| no-TTE | TTE | no-TTE | TTE |
| Ventilation-free days in 30 days (mean (SD)) | 14.11 (17.48) | 17.23 (39.12) | 0.03 | 23.48 (6.23) | 24.57 (4.55) | <0.001 |
| Vasopressor-free days in 30 days (mean (SD)) | 18.25 (14.59) | 20.59 (19.40) | 0.01 | 27.36 (1.66) | 28.60 (1.25) | <0.001 |
| Fluid (mean (SD)) | 2861.13 (2732.35) | 3039.28 (2798.80) | 0.2 | 1357.64 (1752.82) | 918.49 (1527.05) | <0.001 |
| PEEP min (mean (SD)) | 5.73 (2.55) | 5.98 (2.74) | 0.04 | 5.57 (2.07) | 5.57 (1.96) | 0.95 |
| PEEP max (mean (SD)) | 8.53 (4.45) | 9.35 (4.62) | <0.001 | 6.44 (2.22) | 6.32 (2.11) | 0.1 |
| VT min (mean (SD)) | 473.17 (104.68) | 463.33 (100.25) | 0.05 | 468.14 (76.96) | 473.33 (72.11) | 0.05 |
| VT max (mean (SD)) | 622.66 (121.58) | 611.17 (113.60) | 0.05 | 499.23 (79.36) | 502.93 (74.49) | 0.18 |
| Pplat min (mean (SD)) | 18.18 (4.65) | 18.91 (4.52) | 0.002 | 17.72 (5.10) | 17.30 (4.99) | 0.06 |
| Pplat max (mean (SD)) | 24.10 (6.21) | 24.78 (6.03) | 0.03 | 23.93 (6.31) | 23.81 (6.51) | 0.66 |
| MP min (mean (SD)) | 16.28 (6.23) | 17.29 (6.31) | 0.002 | 14.06 (5.68) | 14.53 (6.08) | 0.22 |
| MP max (mean (SD)) | 26.71 (10.79) | 27.73 (10.34) | 0.06 | 22.61 (9.22) | 22.39 (9.71) | 0.73 |
| Norepinephrine use (%) |  |  | <0.001 |  |  | 0.96 |
| 0 | 467(54.4) | 378(44) |  | 1138(62.8) | 1231(63) |  |
| 1 | 392(45.6) | 481(56) |  | 673(37.2) | 724(37) |  |
| Dobutamine use (%) |  |  |  |  |  |  |
| 0 | 836 (97.3) | 787 (91.6) | <0.001 | 1659 (96.8) | 1821 (95.5) | 0.05 |
| 1 | 23 (2.7) | 72 (8.4) |  | 54 (3.2) | 85 (4.5) |  |

**eTable.8. Univariable logistic models assessing impact of transthoracic echocardiography and other factors on in-hospital mortality.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | MIMIC | | eICU-CRD | |
| OR (95%CI) | P value | OR (95%CI) | P value |
| early TTE |  |  |  |  |
| 0 | / | / | / | / |
| 1 | 0.88(0.74-1.04) | 0.142 | 0.73(0.65-0.82) | <0.001 |
| Sex |  |  |  |  |
| F | / | / | / | / |
| M | 1.11(0.94-1.30) | 0.216 | 0.96(0.86-1.07) | 0.46 |
| Age | 1.03(1.02-1.03) | <0.001 | 1.02(1.01-1.02) | <0.001 |
| Race |  |  |  |  |
| Black | / | / | / | / |
| Hispanic | 0.90(0.48-1.65) | 0.74 | 1.63(1.08-2.43) | 0.018 |
| Other | 2.14(1.52-3.04) | <0.001 | 1.72(1.27-2.31) | <0.001 |
| White | 1.43(1.05-1.99) | 0.03 | 1.60(1.30-1.97) | <0.001 |
| Weight | 0.989(0.985-0.993) | <0.001 | 0.996(0.994-0.999) | 0.002 |
| HR | 1.000(0.995-1.004) | 0.99 | 1.005(1.002-1.009) | 0.001 |
| MAP | 0.988(0.981-0.995) | 0.001 | 0.99(0.98-0.99) | <0.001 |
| CODP | 1.01(0.72-1.40) | 0.94 | 0.95(0.83-1.09) | 0.501 |
| Asthma | 0.57(0.41-0.80) | 0.001 | 0.73(0.46-1.13) | 0.18 |
| ARDS | 0.89(0.70-1.14) | 0.37 | 1.17(0.98-1.39) | 0.07 |
| Sepsis | 0.80(0.67-0.95) | 0.01 | 1.39(1.22-1.57) | <0.001 |
| SOFA | 1.08(1.06-1.10) | <0.001 | 1.15(1.13-1.17) | <0.001 |
| OASIS | 1.05(1.04-1.06) | <0.001 | 1.04(1.03-1.04) | <0.001 |
| Hb | 0.94(0.91-0.98) | 0.003 | 0.94(0.92-0.96) | <0.001 |
| WBC | 1.01(1.00-1.02) | 0.18 | 1.00(0.99-1.01) | 0.94 |
| pH | 0.71(0.34-1.49) | 0.37 | 0.35(0.21-0.60) | <0.001 |
| BUN | 1.009(1.006-1.013) | <0.001 | 1.01(1.00-1.01) | <0.001 |
| pO2 | 1.000(0.999-1.001) | 0.95 | 1.000(0.999-1.001) | 0.8 |
| pCO2 | 0.98(0.97-0.99) | <0.001 | 0.992(0.987-0.997) | <0.001 |
| Lactate | 1.17(1.08-1.26) | <0.001 | 1.15(1.13-1.18) | <0.001 |

**eTable.9. Multivariable logistic model assessing impact of transthoracic echocardiography on in-hospital mortality.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | MIMIC | | eICU-CRD | |
| OR (95%CI) | P value | OR (95%CI) | P value |
| early TTE |  |  |  |  |
| 0 | / | / | / | / |
| 1 | 0.77(0.64-0.93) | 0.007 | 0.76(0.67-0.86) | <0.001 |
| Sex |  |  |  | 0.91 |
| F | / | / |  |  |
| M | 1.18(0.99-1.41) 0.07 | | 1.01(0.89-1.14) | |
| Age | 1.02(1.02-1.03) | <0.001 | 1.02(1.01-1.02) | <0.001 |
| Race |  |  |  |  |
| Black | / | / | / | / |
| Hispanic | 1.06(0.54-1.98) | 0.87 | 1.93(1.25-2.95) | 0.003 |
| Other | 2.16(1.50-3.13) | <0.001 | 1.68(1.22-2.31) | 0.001 |
| White | 1.43(1.03-2.01) | 0.04 | 1.71(1.38-2.14) | <0.001 |
| Weight | 0.99(0.98-0.99) | <0.001 | 0.997(0.995-1.000) | 0.08 |
| HR | 1.002(0.996-1.008) | 0.4 | 1.004(1.001-1.008) | 0.02 |
| MAP | 1.003(0.994-1.011) | 0.54 | 1(1.000-1.006) | 0.83 |
| CODP | 1.09(0.76-1.55) | 0.62 | 0.98(0.84-1.14) | 0.78 |
| Asthma | 0.77(0.53-1.09) | 0.15 | 0.99(0.61-1.57) | 0.98 |
| ARDS | 0.89(0.68-1.15) | 0.36 | 1.18(0.99-1.42) | 0.07 |
| Sepsis | 0.66(0.54-0.81） | <0.001 | 1.03(0.90-1.19) | 0.68 |
| SOFA | 1.08(1.05-1.12) | <0.001 | 1.12(1.09-1.14) | <0.001 |
| OASIS | 1.02(1.01-1.03) | 0.002 | 1.01(1.00-1.02) | 0.008 |
| Hb | 0.98(0.93-1.02) | 0.28 | 0.95(0.93-0.98) | <0.001 |
| WBC | 1.01(0.99-1.02) | 0.31 | 1.000(0.99-1.01) | 0.93 |
| pH | 1.59(0.61-4.14) | 0.34 | 1.39(0.68-2.86) | 0.37 |
| BUN | 1.004(1.00-1.01) | 0.02 | 1.000(0.997-1.002) | 0.82 |
| pO2 | 1.000(0.999-1.001) | 0.92 | 1.000(0.999-1.001) | 0.72 |
| pCO2 | 0.99(0.98-1.00) | 0.08 | 1.000(0.995-1.008) | 0.73 |
| Lactate | 1.05(0.96-1.15) | 0.24 | 1.11(1.08-1.14) | <0.001 |