

Prognostic Value of the Radiographic Assessment of Lung Edema Score in Mechanically Ventilated ICU Patients

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Supplementary Materials

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Table S1. Admission characteristics stratified by ARDS subgroup.

| | No ARDS | Non-COVID-ARDS | COVID-ARDS | p |
|--|----------------------|----------------------|----------------------|--------|
| n | 265 | 109 | 48 | |
| Demographics | | | | |
| Age (years, mean (SD)) | 61.66 (14.86) | 63.03 (12.95) | 63.54 (11.20) | 0.546 |
| Male (%) | 179 (67.5) | 78 (71.6) | 33 (68.8) | 0.749 |
| BMI (kg m ⁻²) | 25.99 [22.87, 29.39] | 26.15 [23.57, 29.47] | 27.92 [24.90, 33.06] | 0.014 |
| History | | | | |
| COPD (%) | 28 (10.6) | 8 (7.3) | 2 (4.2) | 0.282 |
| Chronic respiratory failure (%) | 2 (0.8) | 3 (2.8) | 0 (0.0) | 0.194 |
| Renal failure (%) | 22 (8.3) | 6 (5.5) | 3 (6.2) | 0.612 |
| Cardiac failure (%) | 45 (17.0) | 4 (3.7) | 4 (8.3) | 0.001 |
| Admission type | | | | |
| Admission type (%) | | | | <0.001 |
| Emergency surgical | 46 (17.4) | 13 (11.9) | 1 (2.1) | |
| Medical | 176 (66.4) | 84 (77.1) | 47 (97.9) | |
| Planned surgical | 43 (16.2) | 12 (11.0) | 0 (0.0) | |
| Neurosurgery (%) | 45 (17.0) | 6 (5.5) | 0 (0.0) | <0.001 |
| High risk surgery (%) | | | | <0.001 |
| Acute abdomen | 8 (8.9) | 7 (26.9) | 0 (0.0) | |
| Aortic vascular | 24 (26.7) | 5 (19.2) | 0 (0.0) | |
| Cardiac | 22 (24.4) | 3 (11.5) | 0 (0.0) | |
| Other | 34 (37.8) | 10 (38.5) | 0 (0.0) | |
| Admission characteristics | | | | |
| Active malignancy (%) | 24 (9.1) | 21 (19.3) | 4 (8.3) | 0.015 |
| Immunoincompetence (%) | 13 (4.9) | 8 (7.3) | 3 (6.2) | 0.642 |
| Shock (%) | 27 (10.2) | 11 (10.1) | 1 (2.1) | 0.191 |
| Extrapulmonary sepsis (%) | 29 (10.9) | 19 (17.4) | 1 (2.1) | 0.019 |
| Pancreatitis (%) | 3 (1.1) | 4 (3.7) | 0 (0.0) | 0.138 |
| Chemotherapy (%) | 8 (3.0) | 6 (5.5) | 2 (4.2) | 0.514 |
| Aspiration (%) | 22 (8.3) | 16 (14.7) | 1 (2.1) | 0.029 |
| Respiration at inclusion | | | | |
| FiO ₂ (% , median [IQR]) | 30 [25, 40] | 40 [31, 55] | 51 [44, 69] | <0.001 |
| PEEP (cmH ₂ O) | 7 [5, 8] | 10 [8, 12] | 10 [10, 12] | <0.001 |
| TV per IBW (mL kg ⁻¹) | 7.05 [6.15, 8.53] | 7.24 [6.10, 8.63] | 7.21 [6.03, 8.56] | 0.837 |
| Respiratory Rate (min ⁻¹) | 18 [15, 22] | 20 [16, 26] | 21 [16, 26] | <0.001 |
| Driving Pressure (cmH ₂ O) | 13 [9, 17] | 16 [10, 19] | 15 [9, 18] | 0.004 |
| Severity | | | | |
| PaO ₂ / FiO ₂ (mmHg) | 233 [154, 325] | 126 [97, 180] | 105 [80, 137] | <0.001 |
| APACHE II score | 20 [15, 26] | 20 [15, 25] | 18.50 [13, 22] | 0.040 |
| ECMO (%) | 18 (6.8) | 3 (2.8) | 0 (0.0) | 0.064 |
| SOFA score | 9 [7, 11] | 9 [7, 12] | 7 [6, 9] | <0.001 |

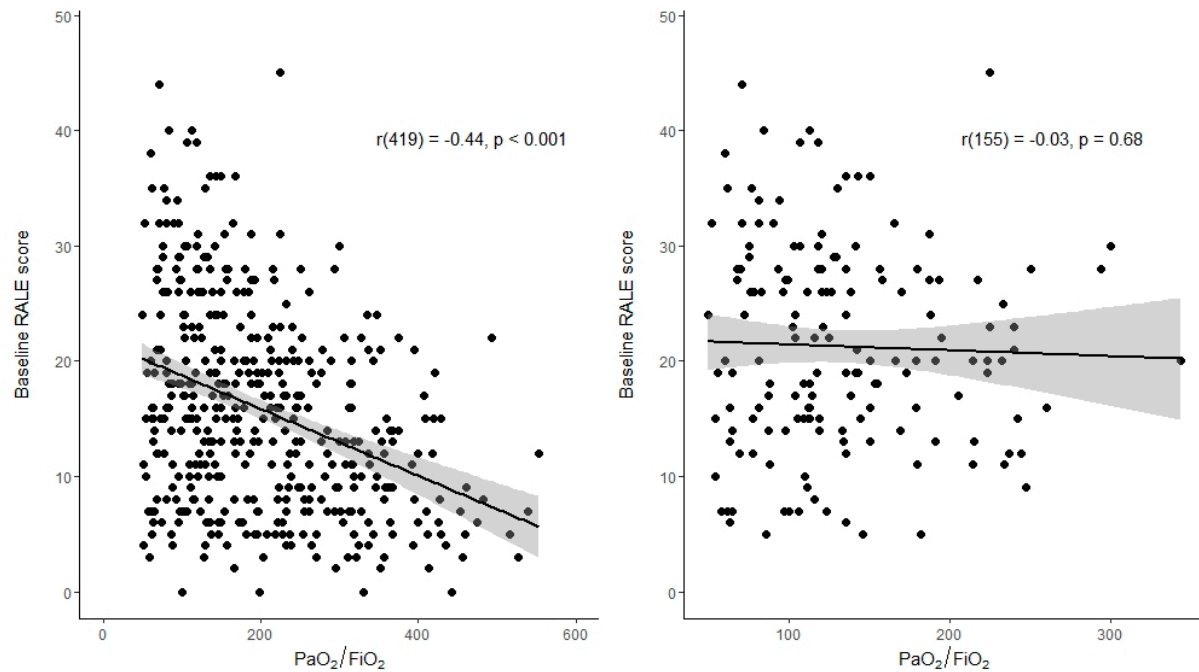
Data is expressed as median [IQR], except for categorical variables (mean (%)) and age (mean (SD)).
 BMI = Body Mass Index, COPD = Chronic Obstructive Pulmonary Disease, PEEP = Positive End-Expiratory Pressure, TV = Tidal Volume, IBW = Ideal Body Weight, ECMO = Extracorporeal Membrane Oxygenation

Table S2. Distribution of baseline RALE scores

| | n | Baseline RALE |
|---------------------|-----|---------------|
| Entire study cohort | 422 | 15 [8, 21] |
| No ARDS | 265 | 12 [7, 18] |
| Non-COVID-ARDS | 127 | 20 [15, 28] |
| COVID-ARDS | 63 | 20 [15, 28] |
| Mild ARDS | 23 | 20 [14, 24] |
| Moderate ARDS | 83 | 20 [15, 27.5] |
| Severe ARDS | 51 | 20 [14, 28.5] |

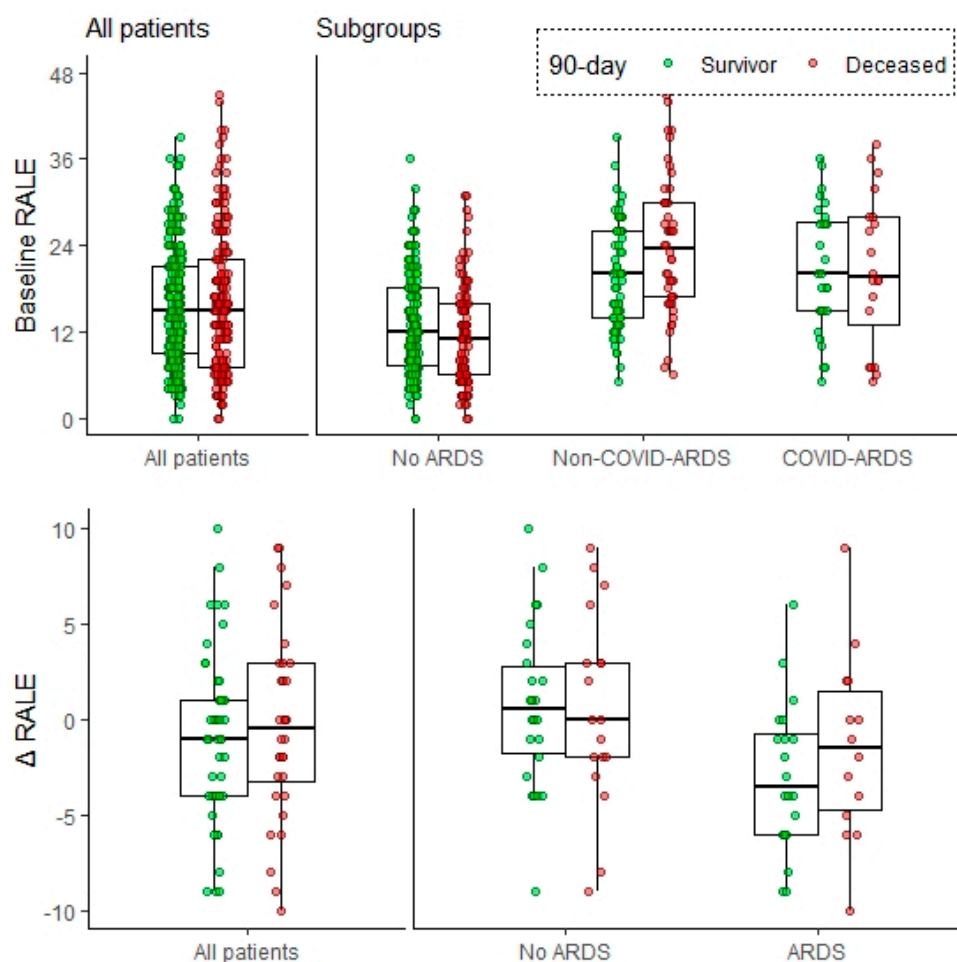
Data are displayed as median [IQR]. Data are displayed for the entire study cohort and for different patient subgroups.

Figure S1. Correlation plots of baseline RALE and $\text{PaO}_2 / \text{FiO}_2$. In all patients (left) and ARDS patients only (right).



Individual patient data points are displayed as dots. On the x-axis, $\text{PaO}_2 / \text{FiO}_2$ is displayed in mmHg and on the y-axis the corresponding baseline RALE scores. The annotated text represents Pearson correlation coefficients and are displayed as “ $r(n) = \text{correlation coefficient}, p\text{-value}$ ”

Figure S2. Baseline RALE scores and Δ RALE (90-day mortality).



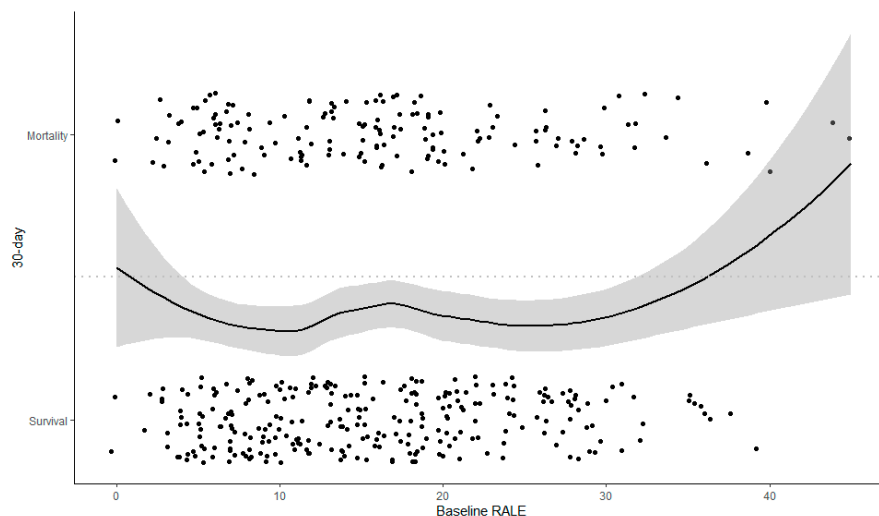
Data are stratified and colored by 90-day mortality in the entire study cohort and in predefined ARDS subgroups (ARDS COVID, ARDS non-COVID, no ARDS). As there were only 5 COVID-ARDS patients with an additional day 1 CXR available, COVID-ARDS and non-COVID-ARDS were combined into ARDS when looking at Δ RALE. Individual patient data points are plotted as dots. RALE = radiographic assessment of lung edema, ARDS = acute respiratory distress syndrome, Δ RALE = early change in RALE score (RALE day 1 – RALE baseline).

Table S3. Baseline RALE (90-day mortality)

| | All patients n = 422 | | No ARDS n = 265 | | non-COVID ARDS n = 109 | | COVID ARDS n = 48 | |
|---|-------------------------|-------|--------------------|-------|---------------------------|--------------|----------------------|-------|
| | HR (CI) | p | HR (CI) | p | HR (CI) | p | HR (CI) | p |
| Univariable analyses | | | | | | | | |
| Baseline RALE* | 1.01 (0.98 - 1.03) | 0.542 | 0.97 (0.94 - 1.01) | 0.139 | <u>1.06 (1.01 - 1.11)</u> | <u>0.015</u> | 1 (0.94 - 1.06) | 0.971 |
| Multivariable analyses (adjusted for confounders: age, gender Apache II) | | | | | | | | |
| Baseline RALE* | 1 (0.98 - 1.03) | 0.713 | 0.96 (0.93 - 1) | 0.061 | <u>1.06 (1.01 - 1.12)</u> | <u>0.014</u> | 1.02 (0.94 - 1.1) | 0.64 |

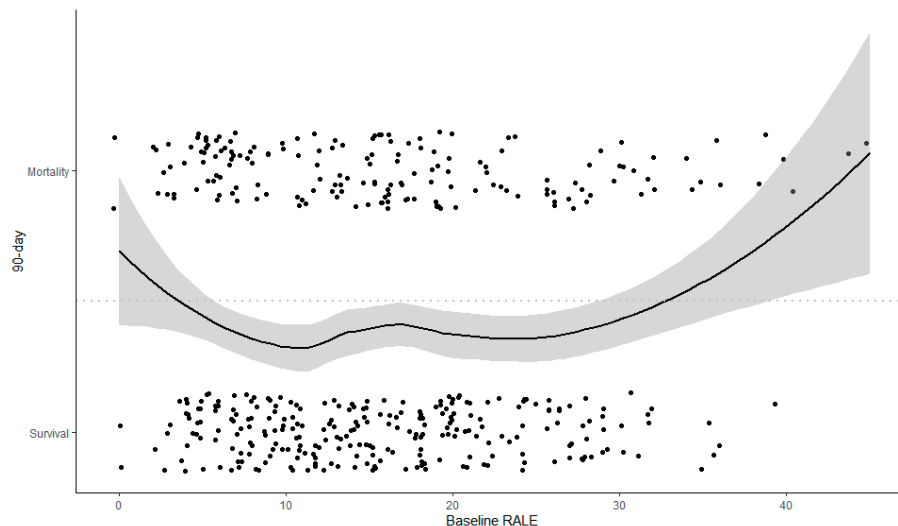
Data are displayed for all patients and predefined subgroups (No ARDS, non-COVID-ARDS, COVID-ARDS). Values are derived by logistic regression and are displayed as OR (95% CI) increase per 1 point increment of predictor variable. RALE = Radiographic assessment of lung edema, OR = Odds ratio, CI = Confidence interval, ARDS = Acute respiratory distress syndrome, COVID = Coronavirus disease 2019.

Figure S3a. Baseline RALE score and 30-day mortality.



Individual patient data points are displayed as dots. On the x-axis, baseline RALE scores are displayed and on the y-axis 30-day mortality is jittered. The black trend line is derived by means of LOESS regression, with the 95% CI in gray.

Figure S3b. Baseline RALE score and 90-day mortality



Individual patient data points are displayed as dots. On the x-axis, baseline RALE scores are displayed and on the y-axis 30-day mortality is jittered. The black trend line is derived by means of LOESS regression, with the 95% CI in gray.

Table S4. Δ RALE and 90d mortality

| | All patients n = 84 | | No ARDS n = 48 | | ARDS n = 36 | |
|---|------------------------|-------|--------------------|-------|---------------------|-------|
| | HR (CI) | p | HR (CI) | p | HR (CI) | p |
| Univariable analyses | | | | | | |
| Δ RALE* | 1 (0.93 - 1.07) | 0.995 | 0.99 (0.9 - 1.09) | 0.837 | 1.01 (0.91 - 1.12) | 0.845 |
| Δ RALE > 0 | 1.05 (0.38 – 2.86) | 1 | 0.78 (0.21 – 2.9) | 0.771 | 1.77 (0.27 – 11.85) | 0.683 |
| Multivariable analyses (corrected for confounders) | | | | | | |
| Δ RALE * | 1.02 (0.94 - 1.09) | 0.677 | 0.99 (0.89 - 1.1) | 0.882 | 1.14 (0.99 - 1.34) | 0.079 |
| Δ RALE > 0 | 1.07 (0.41 - 2.78) | 0.895 | 0.76 (0.21 - 2.62) | 0.661 | 4.26 (0.62 - 39.01) | 0.158 |

Data are displayed for all patients and predefined subgroups. As the number of COVID patients with day 1 data available was low (n=5), COVID-ARDS and Non-COVID-ARDS were combined into ARDS. Values are displayed as OR (95% CI), and are derived by means of Fisher exact test (categorical predictor) or logistic regression (continuous/mixed predictors). * = OR represents increase per 1 point increment of predictor. RALE = Radiographic assessment of lung edema, Δ RALE = Early changes in RALE score, OR = Odds ratio, CI = Confidence interval, ARDS = Acute respiratory distress syndrome, COVID = Coronavirus disease 2019.