

## Appendix 1

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**Table S1** Missing data in propensity matching variable

| Variable                           | Amount of missing data |
|------------------------------------|------------------------|
| Comorbidities                      | NA                     |
| BMI                                | 404 (7%)               |
| Age                                | NA                     |
| Sex                                | 3 (0%)                 |
| Renal replacement therapy          | 6 (0%)                 |
| Prone positioning                  | 21 (0%)                |
| PEEP                               | NA                     |
| PaO <sub>2</sub> /FiO <sub>2</sub> | NA                     |
| Compliance                         | NA                     |

BMI, body mass index.

**Table S2** Baseline characteristics and demographics, and ventilation characteristics per nation (unmatched)

| Characteristics                                    | Argentina                 |                                |        | Spain                       |                                |        | The Netherlands           |                              |      |
|----------------------------------------------------|---------------------------|--------------------------------|--------|-----------------------------|--------------------------------|--------|---------------------------|------------------------------|------|
|                                                    | With tracheostomy (N=359) | Without tracheostomy (N=1,110) | P      | With tracheostomy (N=1,328) | Without tracheostomy (N=2,021) | P      | With tracheostomy (N=168) | Without tracheostomy (N=795) | P    |
| Age, years, median [IQR]                           | 62 [51–69]                | 62 [53–70]                     | 0.38   | 65 [58–71]                  | 64 [56–72]                     | 0.13   | 65 [60–72]                | 66 [57–72]                   | 0.62 |
| Sex, male, (n) %                                   | (266) 74%                 | (741) 67%                      | 0.009  | (993) 75%                   | (1,404) 69%                    | <0.001 | (132) 79%                 | (563) 71%                    | 0.04 |
| BMI, kg/m <sup>2</sup> , median [IQR]              | 30 [27–35]                | 30 [27–34]                     | 0.07   | 29 [26–33]                  | 29 [26–32]                     | 0.98   | 27 [25–30]                | 28 [25–31]                   | 0.33 |
| SOFA score, median [IQR]                           | 5 [4–7]                   | 5 [3–8]                        | 0.64   | 6 [4–8]                     | 7 [4–8]                        | 0.22   | 7 [6–10]                  | 7 [5–9]                      | 0.03 |
| Comorbidities, (n) %                               |                           |                                |        |                             |                                |        |                           |                              |      |
| Cardiac failure                                    | (15) 4%                   | (49) 4%                        | 0.85   | (166) 13%                   | (276) 14%                      | 0.33   | (8) 5%                    | (31) 4%                      | 0.61 |
| COPD                                               | (63) 18%                  | (139) 13%                      | 0.02   | (147) 11%                   | (205) 10%                      | 0.39   | (13) 8%                   | (64) 8%                      | 0.89 |
| Diabetes mellitus                                  | (98) 27%                  | (354) 32%                      | 0.10   | (369) 28%                   | (503) 25%                      | 0.06   | (38) 23%                  | (178) 22%                    | 0.95 |
| Chronic kidney disease                             | (19) 5%                   | (54) 5%                        | 0.75   | (79) 6%                     | (139) 7%                       | 0.28   | (10) 6%                   | (28) 4%                      | 0.14 |
| Liver failure                                      | (6) 2%                    | (9) 1%                         | 0.96   | (33) 2%                     | (46) 2%                        | 0.70   | (1) 1%                    | (2) 0%                       | 0.47 |
| Cancer                                             | (6) 2%                    | (32) 3%                        | 0.21   | (47) 4%                     | (73) 4%                        | 0.91   | (5) 3%                    | (21) 3%                      | 0.81 |
| ARDS severity, (n) %                               |                           |                                | 0.05   |                             |                                | 0.90   |                           |                              | 0.90 |
| Mild                                               | (82) 23%                  | (234) 21%                      |        | (185) 14%                   | (271) 13%                      |        | (53) 32%                  | (245) 31%                    |      |
| Moderate                                           | (213) 59%                 | (608) 55%                      |        | (613) 46%                   | (933) 46%                      |        | (104) 62%                 | (490) 62%                    |      |
| Severe                                             | (64) 18%                  | (268) 24%                      |        | (530) 40%                   | (817) 40%                      |        | (11) 7%                   | (60) 8%                      |      |
| Ventilation variables and parameters, median [IQR] |                           |                                |        |                             |                                |        |                           |                              |      |
| V <sub>T</sub> , mL/kg PBW                         | 6.1 [6.0–7.0]             | 6.1 [6.0–6.8]                  | 0.43   | 6.8 [6.2–7.6]               | 7.1 [6.4–7.7]                  | <0.001 | 6.8 [5.9–7.6]             | 6.4 [5.8–7.2]                | 0.06 |
| PEEP, cmH <sub>2</sub> O                           | 12 [10–14]                | 10 [9–12]                      | 0.02   | 12 [10–14]                  | 12 [10–14]                     | 0.01   | 13 [10–15]                | 13 [10–15]                   | 0.85 |
| P <sub>MAX</sub> , cmH <sub>2</sub> O              | 23 [20–26]                | 22 [20–26]                     | 0.15   | 25 [22–28]                  | 26 [23–29]                     | 0.04   | 26 [23–29]                | 26 [23–30]                   | 0.95 |
| ΔP, cmH <sub>2</sub> O                             | 11 [10–14]                | 12 [10–14]                     | <0.001 | 13 [10–15]                  | 13 [10–16]                     | 0.01   | 13 [11–16]                | 13 [11–16]                   | 0.95 |
| C <sub>RS</sub> , mL/cmH <sub>2</sub> O            | 36 [30–45]                | 34 [26–42]                     | <0.001 | 35 [28–44]                  | 33 [27–44]                     | 0.16   | 36 [28–47]                | 34 [28–43]                   | 0.35 |
| MP, J/min                                          | 16 [13–19]                | 16 [13–20]                     | 0.48   | 17 [14–21]                  | 17 [14–21]                     | 0.88   | 20 [16–25]                | 19 [15–23]                   | 0.02 |
| FiO <sub>2</sub>                                   | 60 [50–80]                | 60 [50–85]                     | 0.006  | 80 [60–100]                 | 80 [60–100]                    | 0.21   | 45 [40–55]                | 45 [40–55]                   | 0.93 |
| Total RR                                           | 24 [22–26]                | 24 [22–27]                     | 0.37   | 22 [19–25]                  | 20 [18–24]                     | <0.001 | 23 [20–26]                | 22 [20–25]                   | 0.02 |

Patient and ventilation characteristics. BMI, body mass index; SOFA, Sequential Organ Failure Assessment; COPD, chronic obstructive pulmonary disease; ARDS, acute respiratory distress syndrome; V<sub>T</sub>, tidal volume; PBW, predicted bodyweight; PEEP, positive end-expiratory pressure; P<sub>MAX</sub>, maximum airway pressure; ΔP, driving pressure; C<sub>RS</sub>, respiratory system compliance; MP, mechanical power of ventilation; FiO<sub>2</sub>, fraction of inspired oxygen; RR, respiratory rate; IQR, interquartile range.

**Table S3** Patient characteristics and ventilation characteristics—matched analysis

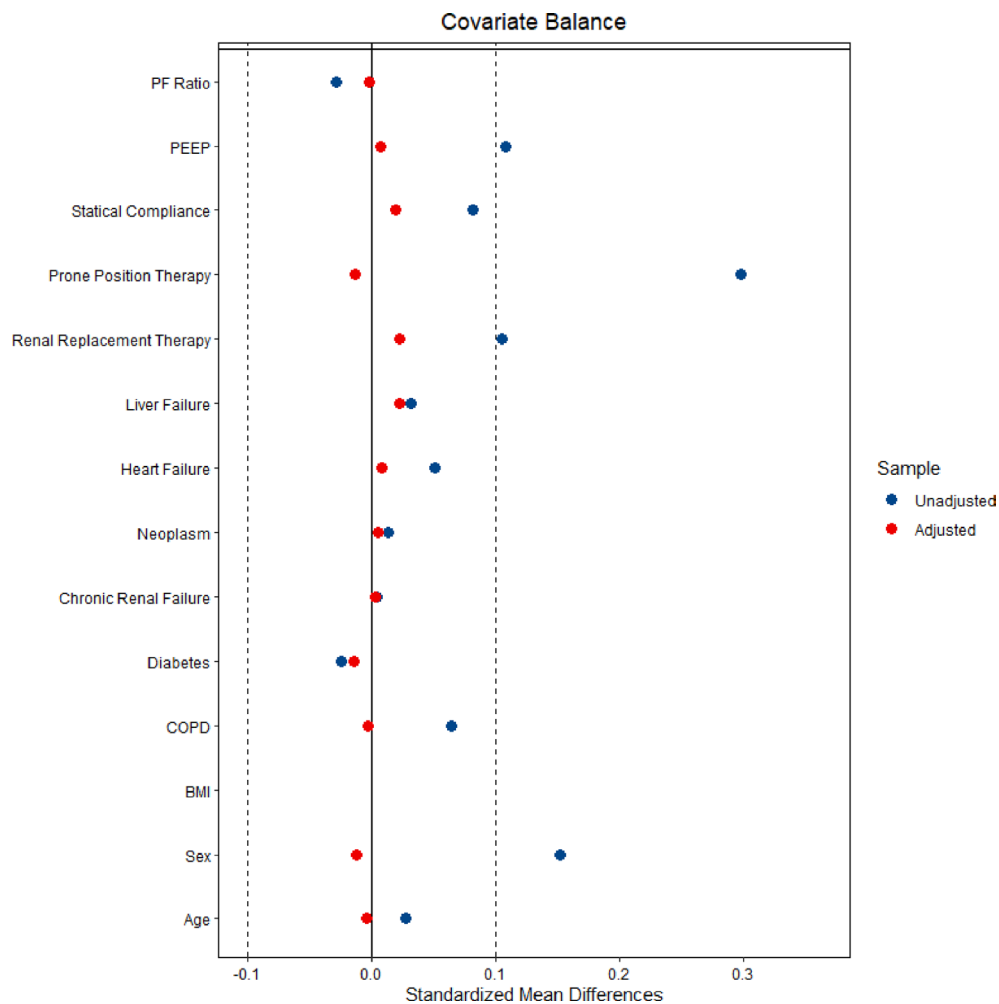
| Characteristics                                       | With tracheostomy (N=1,077) | Without tracheostomy (N=2,331) | P     |
|-------------------------------------------------------|-----------------------------|--------------------------------|-------|
| Age, years, median [IQR]                              | 64 [55–71]                  | 63 [55–71]                     | 0.76  |
| Sex, male, (n) %                                      | (805) 75%                   | (1663) 71%                     | 0.04  |
| BMI, kg/m <sup>2</sup> , median [IQR]                 | 29 [26–33]                  | 29 [26–32]                     | 0.65  |
| SOFA score, median [IQR]                              | 6 [4–8]                     | 6 [4–8]                        | 0.34  |
| Comorbidities, (n) %                                  |                             |                                |       |
| Cardiac failure                                       | (94) 9%                     | (183) 8%                       | 0.38  |
| COPD                                                  | (144) 13%                   | (276) 12%                      | 0.16  |
| Diabetes mellitus                                     | (294) 27%                   | (658) 28%                      | 0.57  |
| Chronic kidney disease                                | (65) 6%                     | (135) 6%                       | 0.77  |
| Liver failure                                         | (21) 2%                     | (33) 1%                        | 0.25  |
| Cancer                                                | (33) 3%                     | (70) 3%                        | 0.92  |
| ARDS severity, (n) %                                  |                             |                                | 0.82  |
| Mild                                                  | (213) 20%                   | (464) 20%                      |       |
| Moderate                                              | (575) 53%                   | (1,265) 54%                    |       |
| Severe                                                | (289) 27%                   | (605) 26%                      |       |
| V <sub>T</sub> , mL/kg PBW, median [IQR]              | 6.6 [6.0–7.3]               | 6.5 [6.0–7.2]                  | 0.30  |
| PEEP, cmH <sub>2</sub> O, median [IQR]                | 12 [10–14]                  | 12 [10–14]                     | 0.05  |
| P <sub>MAX</sub> , cmH <sub>2</sub> O, median [IQR]   | 25 [22–28]                  | 25 [22–28]                     | 0.24  |
| ΔP, cmH <sub>2</sub> O, median [IQR]                  | 12 [10–15]                  | 13 [10–15]                     | 0.003 |
| C <sub>RS</sub> , mL/cmH <sub>2</sub> O, median [IQR] | 35 [28–45]                  | 34 [27–44]                     | 0.004 |
| MP, J/min, median [IQR]                               | 17 [14–21]                  | 17 [14–21]                     | 0.85  |
| FiO <sub>2</sub> , median [IQR]                       | 60 [50–90]                  | 60 [46–85]                     | 0.01  |
| Total RR, breaths per min, median [IQR]               | 22 [20–25]                  | 23 [20–26]                     | 0.73  |

Patient and ventilation characteristics. BMI, body mass index; SOFA, Sequential Organ Failure Assessment; COPD, chronic obstructive pulmonary disease; ARDS, acute respiratory distress syndrome; V<sub>T</sub>, tidal volume; PBW, predicted bodyweight; PEEP, positive end-expiratory pressure; P<sub>MAX</sub>, maximum airway pressure; ΔP, driving pressure; C<sub>RS</sub>, respiratory system compliance; MP, mechanical power of ventilation; FiO<sub>2</sub>, fraction of inspired oxygen; RR, respiratory rate; IQR, interquartile range.

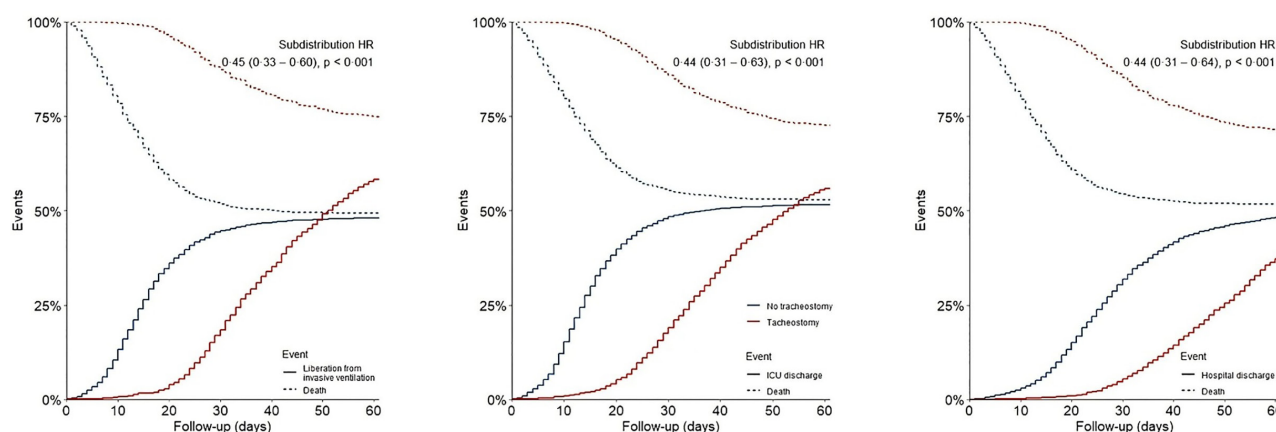
**Table S4** Outcomes— matched analysis

| Outcomes                   | With tracheostomy (N=1,077) | Without tracheostomy (N=2,331) | P      |
|----------------------------|-----------------------------|--------------------------------|--------|
| 28-day mortality, (n) %    | (125) 12%                   | (1,132) 49%                    | <0.001 |
| 60-day mortality, (n) %    | (282) 26%                   | (1,216) 52%                    | <0.001 |
| LOS ICU, median [IQR]      | 38 [28–52]                  | 13 [9–19]                      | <0.001 |
| LOS hospital, median [IQR] | 49 [35–68]                  | 20 [12–29]                     | <0.001 |

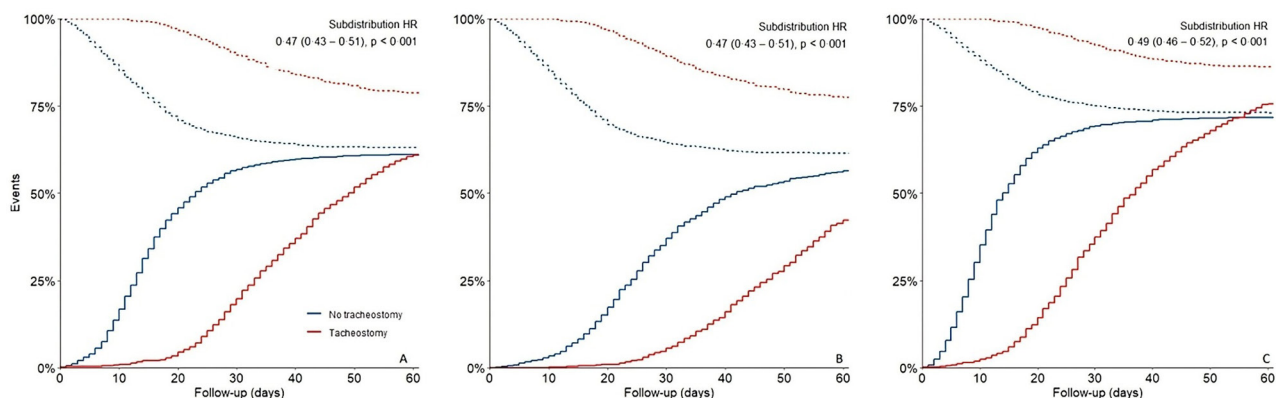
28-day and 60-day mortality rate, ICU and hospital LOS in a matched analysis. LOS, length of stay; ICU, intensive care unit.



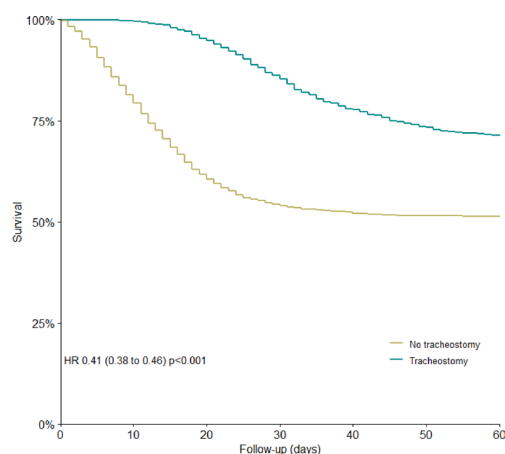
**Figure S1** Covariate balance. PF,  $\text{PaO}_2/\text{FiO}_2$ ; PEEP, positive end-expiratory pressure; COPD, chronic obstructive pulmonary disease; BMI, body mass index.



**Figure S2** Competing risk in an unmatched analysis. Dotted lines represent patients who died and solid lines represent (A) patients who liberated from invasive ventilation (B) patients discharged from the ICU and (C) patients discharged from hospital.



**Figure S3** Competing risk in a matched analysis. Dotted lines represent patients who died and solid lines represent (A) patients who liberated from invasive ventilation (B) patients discharged from the ICU and (C) patients discharged from hospital.



**Figure S4** 60-day mortality after correcting for immortal time bias.