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| **Supplemental Table 1. Statistics of Ventilation and Hemodynamic Variables (Linear Mixed Model with Interaction)**  |
| **VF [bpm]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 12.4 | 0.2 | 50.576 | **<2e-16** |
|  PEEP | 0 | 0.1 | -0.258 | 0.797 |
|  FLEX | 0.1 | 0.1 | 0.775 | 0.440 |
|  PEEP : FLEX | -0.1 | 0.2 | -0.366 | 0.716 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 0.2 | 0.5 |
| **VT [ml· kg-1]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 7.1 | 0.2 | 31.798 | **<2e-16** |
|  PEEP | -0.1 | 0.1 | -1.596 | 0.114 |
|  FLEX | -0.1 | 0.1 | -0.958 | 0.341 |
|  PEEP : FLEX | 0.1 | 0.1 | 1.129 | 0.262 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 0 | 0.2 |
| **CRS [ml · cm H2O-1]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 52.2 | 2.1 | 24.739 | **<2e-16** |
|  PEEP | -0.1 | 0.3 | -0.376 | 0.708 |
|  FLEX | -0.4 | 0.3 | -1.296 | 0.199 |
|  PEEP : FLEX | -0.4 | 0.5 | -0.776 | 0.440 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 806.8 | 28.4 |
| **RRS [cm H2O · s ·l-1]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 7.3 | 0.3 | 28.190 | **<2e-16** |
|  PEEP | 0.1 | 0.1 | 0.638 | 0.525 |
|  FLEX | 0 | 0.1 | -0.258 | 0.797 |
|  PEEP : FLEX | 0 | 0.1 | -0.238 | 0.813 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 0.1 | 0.4 |
| **Mean REX [cm H2O · s ·l-1]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 7.6 | 1.1 | 6.624 | **2.75e-09** |
|  PEEP | -0.8 | 1.3 | -0.614 | 0.541 |
|  FLEX | 29.6 | 1.3 | 22.284 | **<2e-16** |
|  PEEP : FLEX | -1.5 | 1.9 | -0.815 | 0.417 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 26.5 | 5.1 |
| **Peak flowexp [ml · s-1]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | -429.0 | 10.5 | -40.94 | **<2e-16** |
|  PEEP | 3.3 | 7.3 | 0.45 | 0.654 |
|  FLEX | 184.8 | 7.3 | 25.2 | **<2e-16** |
|  PEEP : FLEX | 1.3 | 10.4 | 0.13 | 0.897 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 807 | 28 |
| **Peak flowinsp [ml · s-1]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 468.9 | 9.6 | 48.895 | **<2e-16** |
|  PEEP | 0.9 | 5.5 | 0.172 | 0.864 |
|  FLEX | 1.9 | 5.5 | 0.338 | 0.736 |
|  PEEP : FLEX | 0.1 | 7.8 | 0.008 | 0.993 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 456 | 21 |
| **Ptrach\_peak [cm H2O]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 16.3 | 0.4 | 40.467 | **<2e-16** |
|  PEEP | 1.9 | 0.1 | 21.938 | **<2e-16** |
|  FLEX | -0.1 | 0.1 | -0.675 | 0.501 |
|  PEEP : FLEX | 0.1 | 0.1 | 0.917 | 0.362 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 0.1 | 0.3 |
| **Pplateau [cm H2O]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 16.2 | 0.4 | 39.640 | **<2e-16** |
|  PEEP | 1.9 | 0.1 | 21.913 | **<2e-16** |
|  FLEX | -0.1 | 0.1 | -0.616 | 0.539 |
|  PEEP : FLEX | 0.1 | 0.1 | 0.959 | 0.340 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 0.1 | 0.3 |
| **Pmean [cm H2O]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 8.6 | 0.2 | 55.368 | **<2e-16** |
|  PEEP | 1.9 | 0.1 | 14.771 | **<2e-16** |
|  FLEX | 1.0 | 0.1 | 7.769 | **1.46e-16** |
|  PEEP : FLEX | 0 | 0.2 | -0.093 | 0.926 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 0.2 | 0.5 |
| **PetCO2 [mmHg]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 36.2 | 0.3 | 116.245 | **<2e-16** |
|  PEEP | 0 | 0.3 | 0.039 | 0.969 |
|  FLEX | 0.2 | 0.3 | 0.626 | 0.533 |
|  PEEP : FLEX | 0 | 0.4 | 0.111 | 0.912 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 1.0 | 1.0 |
| **Horowitz-Index [mmHg]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 395.5 | 14.6 | 27.141 | **<2e-16** |
|  PEEP | 1.2 | 7.3 | 0.169 | 0.866 |
|  FLEX | -5.6 | 7.3 | -0.765 | 0.446 |
|  PEEP : FLEX | -0.9 | 10.3 | -0.089 | 0.929 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 3.995e-5 | 0.006 |
|  |  |  |  |  |
|  |  |  |  |  |
| **HR [bpm]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 53.7 | 1.9 | 28.915 | **<2e-16** |
|  PEEP | -0.7 | 0.9 | -0.758 | 0.451 |
|  FLEX | 0.1 | 0.9 | 0.055 | 0.957 |
|  PEEP : FLEX | 1.4 | 1.3 | 1.079 | 0.284 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 13.4 | 3.7 |
| **MAP [mmHg]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 80.5 | 1.7 | 46.627 | **<2e-16** |
|  PEEP | -2.7 | 1.3 | -2.027 | **0.046** |
|  FLEX | -1.7 | 1.3 | -1.312 | 0.193 |
|  PEEP : FLEX | 2.1 | 1.9 | -1.109 | 0.271 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 26.3 | 5.1 |
| **Catecholamine dose [ng· kg-1·min-1]** |
| **Fixed effects** | **Estimate** | **Std. Error** | **t-value** | **p-value** |
|  Intercept | 26.7 | 4.9 | 5.471 | **5.26e-16** |
|  PEEP | -3.3 | 1.6 | -2.042 | **0.044** |
|  FLEX | 0.3 | 1.6 | 0.204 | 0.839 |
|  PEEP : FLEX | 2.3 | 2.3 | 1.011 | 0.315 |
| Random effects | Variance  | Std. Dev. |  |  |
|  Patient (RM) | 40.0 | 6.3 |

PEEP = positive end expiratory pressure; FLEX = Flow Controlled Expiration; VF = ventilation frequency; VT = tidal volume; PetCO2 = end-tidal carbon dioxide partial pressure; Horowitz-Index = ratio of partial pressure of oxygen and the inspiratory fraction of oxygen; Peak flowexp = maximum expiration flow; Peak flowinsp = maximum inspiration flow, Ptrach\_peak = tracheal peak pressure; Pplateau = plateau pressure; Pmean = mean airway pressure; CRS = compliance of the respiratory system; RRS = resistance of the respiratory system; REX = mean expiratory airway resistance; HR = heart rate; MAP = mean arterial pressure; PEEP : FLEX = Interaction PEEP with FLEX, RM = Repeated Measurement.