**Supplemental Table 1 Characteristics of the included patients**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trial | Jaber et al., 2016 [9] | Lemiale et al.,2015 [22] | Frat et al.,2015 [10] | Brambilla et al., 2014 [8] | Zhan et al., 2012 [19] | Squadrone et al., 2010 [20] |
| Populations |  |  |  |  |  |  |
| 1. Enrollment period
 | 2013.05-2014.09 | 2013.08-2015.01 | 2011.02-2013.04 | 2010.02-2013.02 | 2006.08-2009.12 | 2005.10-2007.11 |
| 1. Total number of included patients
 | 293 | 374 | 207 | 81 | 40 | 40 |
| 1. Study center
 | 20 ICUs in France | 28 ICUs in France and Belgium | 23 ICUs in France and Belgium | 4 ICUs in Italy | 10 ICUs in China | 2 Hematological units in Italy |
| 1. Enrollment criteria and definition in the trials
 | (1)PaO2 <60mmHg or SpO2≤90% (room air) (2)PaO2<80mmHg (15 L/min of oxygen) plus RR ≥30/min or Accessory muscle use | 1. PaO2 <60 mm Hg (room air)
2. RR >30/min
3. labored breathing or respiratory distress or dyspnea at rest)
4. respiratory symptom duration ≤72 hours;
 | 1. RR ≥25/min；
2. PaO2/FiO2≤300 mmHg(10 L/min of oxygen or more at least 15 min)
3. PaCO2≤45mmHg
4. an absence of clinical history of underlying chronic respiratory failure
 | 1. diagnosis of pneumonia as the only cause of hARF
2. PaO2/FiO2≤250 at least 15 min through a Venturi mask (FiO2 ≥ 0.50 at least 15 min)
3. Either RR≥ 30 /min or respiratory distress.
 | acute onset; a clinical presentation of respiratory distress; 200 mm Hg≤PaO2/FiO2≤300 mm Hg (≤50% of oxygen)) presence of bilateral pulmonary infiltrates on postero anterior chest radiograph; and no evidence of left heart failure as assessed by echocardiography and/or a pulmonary artery wedge pressure of 18 mm Hg | (1) radiological evidence of bilateral pulmonary infiltrates(2) SaO2<90% (room air)(3)RR >25 /min |
| 1. Mean age (yr)
 | 63.4 | 62.5 | 60 | 67.2 | 46.5 | 49 |
| Design | RCT | RCT | RCT | RCT | RCT | RCT |
|  |
| Severity at enrollment (mean) |  |  |  |
| 1. PH
 | 7.41 | NA | 7.44 | 7.45 | 7.44 | 7.46 |
| 1. PaO2/FiO2

(mean, mmHg) | 194.5 | 143 | 155 | 141 | 230 | 269 |
| 1. PaCO2

(mean, mmHg) | 38 | NA | 34.5 | 33.0 | 31.3 | 35.5 |
| 1. SAPS II score
 | 33.5 | NA | 25.5 | 35.2 | NA | 41.5 |
| 1. SOFA score
 | 4.4 | 5 | 3.7 | NA | 3.8 | NA |
| 1. SAPS
 | NA | NA | NA | NA | NA | NA |
| NIV |  |  |  |  |  |  |
| 1. Interface type
 | Face mask | Face mask | Face mask | Helmet | Face mask | Helmet |
| 1. NIV mode
 | BiPAP | CPAP | CPAP | CPAP | BiPAP | CPAP |
| Outcomes |  |  |  |  |  |  |
| 1. Intubate rate

(N (n/N), C(n/N)) | 49/148, 66/145 | 73/191, 82/183 | 55/110, 44/94 | 6/40, 26/41 | 1/21,4/19 | 2/20,14/20 |
| 1. ICU mortality

(N (n/N), C(n/N)) | NA | NA | 27/110, 18/94 | NA | 1/21,5/19 | 3/4,15/16 |
| 1. Hospital mortality

(N (n/N), C(n/N)) | NA | NA | NA | 2/40, 7/41 | 1/21,5/19 | 3/20, 15/20 |

N is for NIV and C is for Control; NIV, noninvasive ventilation; NA, Not available; SAPS II, Simplified Acute Physiology Score II; SOFA score, Sequential Organ Failure Assessment score; SAPS, Simplified Acute Physiological Score; RR, respiratory rate; HR, heart rate. BiPAP, bilevel inspiratory positive airway pressure; CPAP, continuous positive airway pressure

Continued **Table 1 Characteristics of the included patients**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trial | Squadrone et al., 2005 [21] | Ferrer et al., 2003 [24] | Hilbert et al.,2001 [23] | Delclaux et al., 2000 [25]  | Antonelli et al., 2000 [26] |  |
| Populations |  |  |  |  |  |  |
| 1. Enrollment period
 | 2002.06-2003.11 | NA | 1998.05-1999.12 | 1997.09-1999.01 | 1995.12-1997.10 |  |
| 1. Total number of included patients
 | 209 | 75 | 52 | 81 | 31 |  |
| 1. Study center
 | 15 ICUs in Italy | 3 ICUs in Spain | 1 ICU in France | 6 ICUs in France, Spain, Tunisia and Italy | 1 ICU in Italy |  |
| 1. Enrollment criteria and definition in the trials
 | PaO2/FiO2≤300mmHg | Severe AHRF, defined as PaO2 persistently (more than 6 to 8 hours) < 60mmHg or SaO2 <90% persistently while breathing conventional Venturi oxygen at a maximal concentration (50%) | (1)A clinical history of pulmonary infiltrates and fever(2)severe dyspnea at rest(3)PaO2/FiO2<200. | (1) acute respiratory insufficiency, defined as PaO2/FIO2 ≤300 mm Hg (oxygen at 10 L/min or more for 15 minutes),(2) the presence of bilateral lung infiltrates on a posteroanterior chest radiograph;(3) Randomization within 3 hours after the criteria were first fulfilled. | (1)Acute respiratory distress(2)RR≥ 35/min, PaO2/FiO2<200 while the patient was breathing oxygen through a Venturi mask; (3) active contraction of the accessory muscles of respiration or paradoxical abdominal motion. |  |
| 1. Mean age (yr)
 | 65.5 | 61.5 | 49 | 58 | 44.5 |  |
| Design | RCT | RCT | RCT | RCT | RCT |  |
| Severity at enrollment (mean) |  |  |  |  |  |  |
| 1. PH
 | 7.39 | 7.41 | 7.44 | 7.42 | 7.45 |  |
| 1. PaO2/FiO2

(mean, mmHg) | 251 | 102.5 | 138.5 | 144 | 129 |  |
| 1. PaCO2

(mean, mmHg) | 39 | 36.5 | 37.5 | 36 | 40 |  |
| 1. SAPS II score
 | 27.5 | 33.5 | 43.5 | 32 | NA |  |
| 1. SOFA score
 | NA | NA | NA | NA | NA |  |
| 1. SAPS
 | NA | NA | NA | NA | 13 |  |
| NIV |  |  |  |  |  |  |
| 1. Interface type
 | Helmet | Face/Nasal mask | Full-face mask | Face mask | Face mask |  |
| 1. NIV mode
 | CPAP | BiPAP | CPAP | CPAP | BiPAP |  |
| Outcomes |  |  |  |  |  |  |
| 1. Intubate rate

(N (n/N), C(n/N)) | 1/105, 10/104 | 12/36,26/39 | 12/26, 20/26 | 15/40, 18/41 | 4/16, 9/15 |  |
| 1. ICU mortality

(N (n/N), C(n/N)) | NA | 8/36,19/39 | 10/26, 18/26 | 9/40, 9/41 | 4/16, 6/15 |  |
| 1. Hospital mortality

(N (n/N), C(n/N)) | 0/105, 3/104 | NA | 13/26, 21/26 | 12/40,11/41 | NA |  |

N is for NIV and C is for Control; NIV, noninvasive ventilation; NA, Not available; SAPS II, Simplified Acute Physiology Score II; SOFA score, Sequential Organ Failure Assessment score; SAPS, Simplified Acute Physiological Score; RR, respiratory rate; HR, heart rate. BiPAP, bilevel inspiratory positive airway pressure; CPAP, continuous positive airway pressure