CRITICAL ROUNDS

MICRO LABS LIMITED

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Dear Doctor,

Greetings from Micro Labs limited. We are happy to bring "CRITICAL ROUNDS" containing latest information in the field of Critical care medicine.

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Looking forward to your valuable feedback

Best Regards,
Medical Team, Micro Labs Ltd

Nutritional and Neuromotor Aspects of Post-Intensive Care Syndrome in Newborns

Background:

The term post-intensive care syndrome refers to the consequences that patients who stay in the intensive care unit (ICU) for an extended amount of time have on one or more domains. Nutritional support for ICU patients, particularly neonates, is critical for body weight maintenance and increase. Prematurity-related complications may necessitate extensive stays in the hospital, leading to an increased risk of stress. The advancement of medical care in recent decades has resulted in increased neonatal survival, allowing preliminary investigations to identify signs and symptoms that may signal the likelihood of having Post-Intensive care syndrome (PICS) in the future.

Objective:

To characterise and confirm the incidence of symptoms associated with Post-Intensive Care Syndrome in the physical domain, specifically in the neuropsychomotor and nutritional fields, in children.

Methods:

Study comprised of twenty-six children of both sexes, aged one to twelve months, who were hospitalised in the Neonatal and Pediatric ICU for more than three days. The Shapiro-Wilk test was used to confirm the normality assumptions. The mean and standard deviation of continuous variables are shown. A measure of central tendency was offered as median for discrete or non-parametric variables. Logistic binary regression was used to determine the relationship between nutritional status, motor development, and morbidity, employing a variable selection approach based on the model's likelihood ratio's best fit. The Kruskal-Wallis and Mann-Whitney tests were used to confirm the link between ICU time, motor development, and nutritional status.

Results:

The review of the children's data revealed a range of gestational ages, with 7 children classed as full-term newborns (27%) and 19 preterm newborns (19%). Children who were in the ICU for a longer time had aberrant motor development, with a median stay of 16 days, compared to 13 days for children with normal development.

Motor assessment using the AIMS × Gestational age performed after admission

Motor Performance	Premature (N)	Median ICU (days)	Full term (N)	Median ICU (days)	Total (N)	Median ICU (days)
Changed	12	18	4	16	16	16
Expected	7	18	3	8	10	13

According to the BMI classification by age, 81 percent had an adequate nutritional diagnostic (n = 21) and 19 percent had an altered nutritional diagnosis (n = 5), as follows: 8 percent (n = 2) were skinny, whereas 11 percent (n = 3) were overweight.

Nutritional classification of children treated after hospitalization

Weight	Sample (N)	Sample %	Median (days of hospitalization)	Premature (N)	Full term (N)
Adequate	21	81	11	12	9
Low weight	2	8	52	2	0
overweight	3	11	18	3	0

For all of the groups, there was no significant difference in length of stay based on nutritional diagnosis (p = 0.956). There was also no significant relationship between length of stay and sufficient versus inadequate nutritional diagnostic (thinness or overweight diagnosis) (p = 0.819).

Conclusion:

Children who remained in the ICU had a tendency to have alterations in their motor and nutritional performance, indicating that more research is needed to confirm the effects of hospitalisation in Intensive Care Units.

Reference:

Drews JRP, Campos JA, Guimarães PB, Trandafilov RMV, Lopes NS (2021) Post-Intensive Care Syndrome in Newborns from a Nutritional and Neuromotor Perspective. Int J Crit Care Emerg Med 7:129.

RETRASCORE a new measure developed to predict early mortality in trauma ICU patients

Background:

In young adults, trauma is still the most common cause of death and disability. In international trauma registries, the Trauma and Injury Severity Score (TRISS) has become the most widely used measure for outcome adjustment and benchmarking. In 2014, The Trauma Register DGUTM (TR-DGU) produced the Revised Injury Severity Classification (RISC) score and its revised version for outcome adjustment, reaching an AUC 0.95 in the derivation and validation datasets in terms of mortality prediction, with adequate precision and calibration. These scores, on the other hand, can be used to all trauma patients and so are not unique to trauma ICU patients.

Objective:

To generate a new score for early death prediction in trauma ICU patients due to the lack of a specific trauma ICU score and by using data from the Spanish Trauma ICU registry (RETRAUCI).

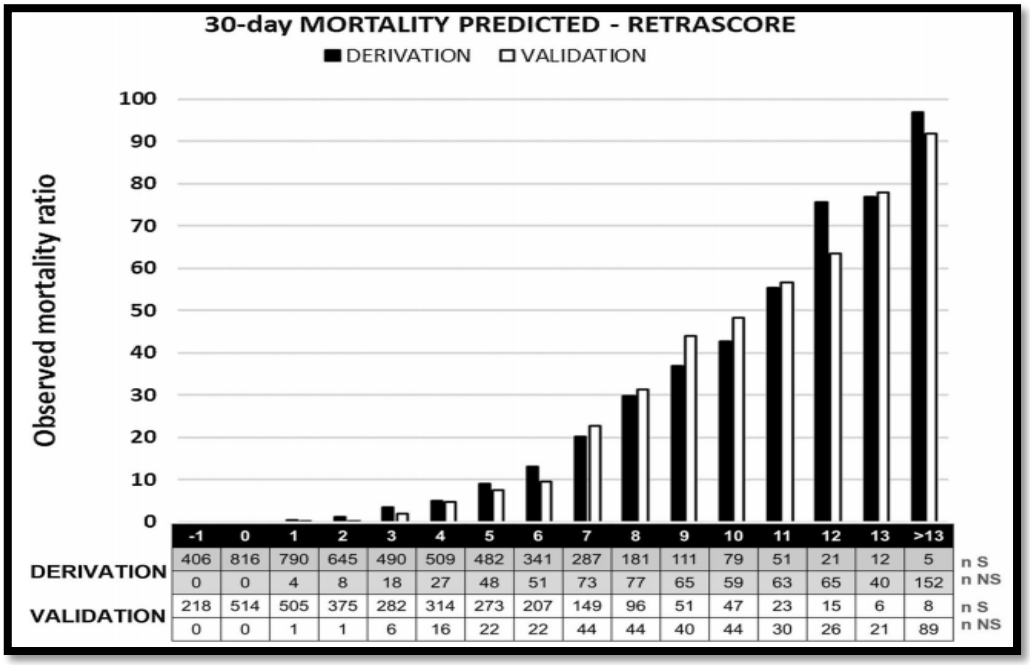
Methods:

This is a retrospective study that used the RETRAUCI (Spanish Trauma ICU Registry) from 2015 to 2019. The derivation (2015–2017) and validation sets (2018–2019) of patients were separated and analysed. The RETRAUCI variables was used in this study, that could be gathered in the first 24 hours after ICU admission as candidate factors to be related with death. A basic score (RETRASCORE) was produced using logistic regression methods, with points awarded to each selected variable. The model's performance was evaluated using global measurements, discrimination, and calibration.

Results:

A total of 9465 patients were included in the study: 5976 for the derivation set and 3489 for the validation set. The 30-day mortality rate was 12.2%.

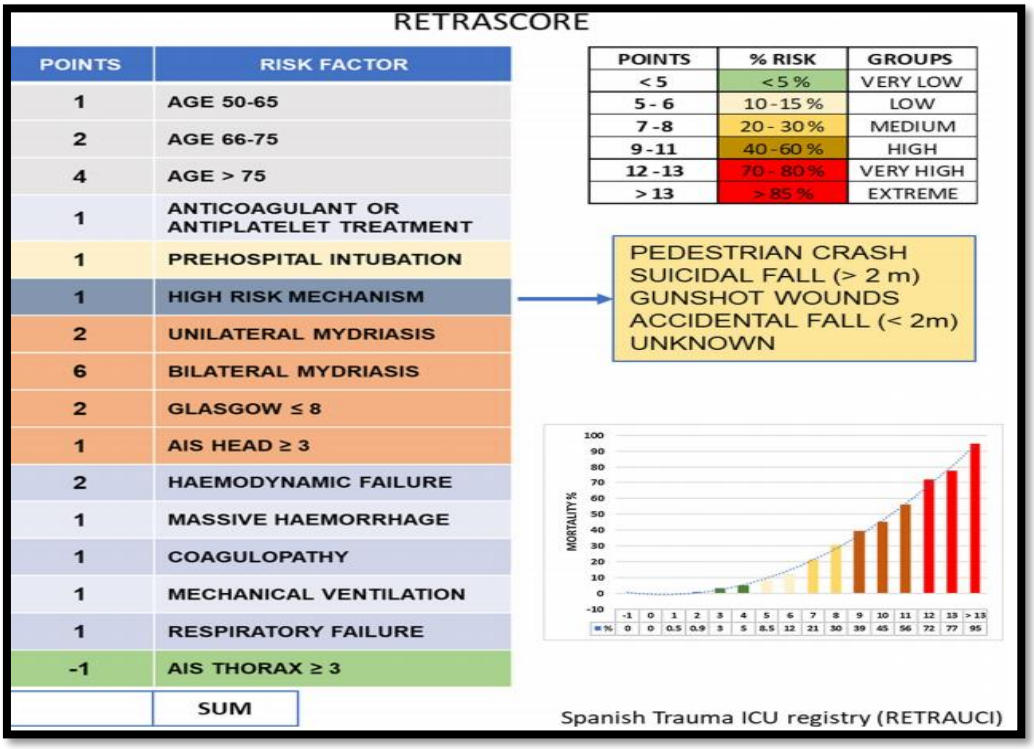
Probability of death according to the total score. Derivation and validation sets



	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	>13	
DERIVATION	406	816	790	645	490	509	482	341	287	181	111	79	51	21	12	5	n S
	0	0	4	8	18	27	48	51	73	77	65	59	63	65	40	152	n NS
VALIDATION	218	514	505	375	282	314	273	207	149	96	51	47	23	15	6	8	n S
	0	0	1	1	6	16	22	22	44	44	40	44	30	26	21	89	n NS

The following equation was used to calculate the chance of 30-day mortality: 1/(1+exp (-y)) (Age 50–65), where y=0.598 +1.239 (66–75 years old) (Age>75) +2.198 +0.662 (PRECOAG) +0.349 (PRECOAG) +0.336 (Pre-hospital intubation) (High-risk mechanism) +0.841 (Glasgow8) +0.950 (unilateral mydriasis) +3.217 (bilateral mydriasis) +0.495 (MAIS-Head)0.271+0.495 (MAIS-Head)0.271+0.495 (MAIS-Head) (MAIS-Thorax) +1.148 (Haemodynamic failure) +0.708 (Respiratory failure) +0.567 (Coagulopathy) +0.580 (Mechanical ventilation) +0.452 (Massive haemorrhage) –5.432. In the derivation set, the AUROC was 0.913 (0.903–0.923) and in the validation set, it was 0.929 (0.918–0.940).

Summary sheet for the RETRASCORE mode



RETRASCORE

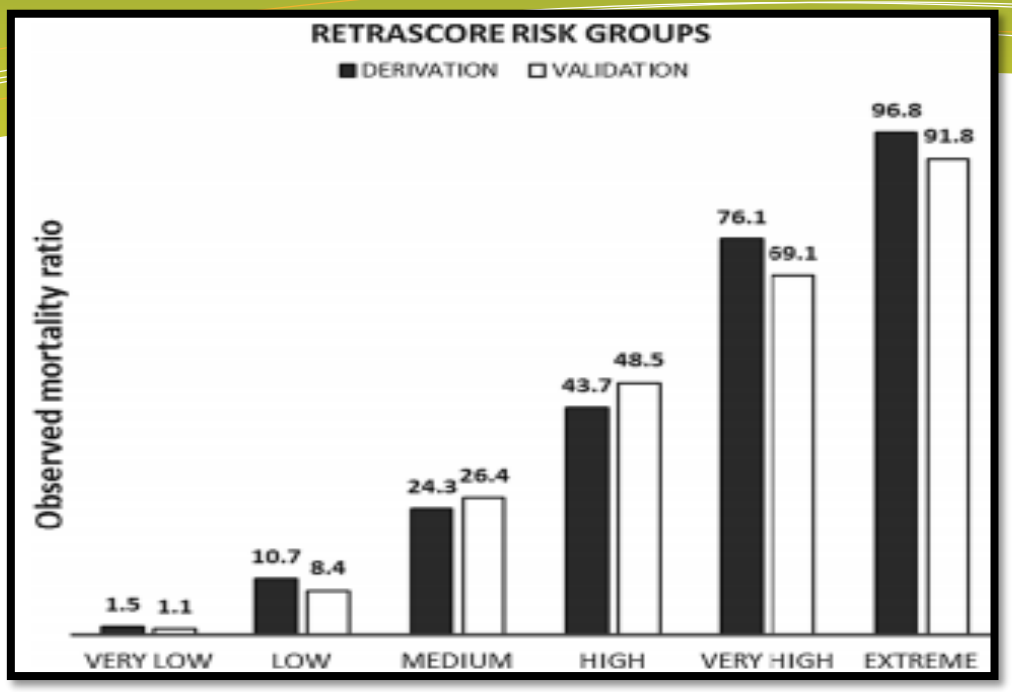
POINTS	RISK FACTOR
1	AGE 50-65
2	AGE 66-75
4	AGE > 75
1	ANTICOAGULANT OR ANTIPLATELET TREATMENT
1	PREHOSPITAL INTUBATION
1	HIGH RISK MECHANISM
2	UNILATERAL MYDRIASIS
6	BILATERAL MYDRIASIS
2	GLASGOW ≤ 8
1	AIS HEAD ≥ 3
2	HAEMODYNAMIC FAILURE
1	MASSIVE HAEMORRHAGE
1	COAGULOPATHY
1	MECHANICAL VENTILATION
1	RESPIRATORY FAILURE
-1	AIS THORAX ≥ 3
	SUM

POINTS	% RISK	GROUPS
< 5	< 5 %	VERY LOW
5 - 6	10 - 15 %	LOW
7 - 8	20 - 30 %	MEDIUM
9 - 11	40 - 60 %	HIGH
12 - 13	70 - 80 %	VERY HIGH
> 13	> 85 %	EXTREME

PEDESTRIAN CRASH
SUICIDAL FALL (> 2 m)
GUNSHOT WOUNDS
ACCIDENTAL FALL (< 2m)
UNKNOWN

Spanish Trauma ICU registry (RETRAUCI)

RETRASCORE risk categories in derivation and validation sets



Conclusion:

This study demonstrated, the newly established RETRASCORE is a specific, early, and easy-to-calculate score for predicting in-hospital mortality in trauma ICU patients. This is the first trauma score created specifically for trauma ICU patients. It must be externally validated, even when it has passed internal validation.

Reference:

Serviá L,et al; the Neurointensive Care and Trauma Working Group of the Spanish Society of Intensive Care Medicine (SEMICYUC). Development of a new score for early mortality prediction in trauma ICU patients: RETRASCORE. Crit Care. 2021 Dec 7;25:420.

A comprehensive review and network meta-analysis on the efficacy of non-invasive and invasive respiratory management techniques in adult patients with acute hypoxaemic respiratory failure

Background:

Acute hypoxaemic respiratory failure (AHRF) is the most prevalent reason for adult patients to be admitted to the intensive care unit (ICU), with a hospital death rate of around 30%. In patients with AHRF, non-invasive respiratory treatment has been extensively studied. Non-invasive ventilation has been reported to be used in 15% of patients with acute respiratory distress syndrome (ARDS), although it has been linked to increased ICU mortality, particularly in patients with severe hypoxiaemia. Because exact monitoring of the actual inspired percentage of oxygen is unavailable and positive end-expiratory pressure (PEEP) is not employed, a definitive diagnosis of ARDS may be difficult or impossible before the initiation of respiratory management techniques. Both PEEP and pressure support are likely to improve oxygenation in patients with AHRF when non-invasive ventilation is used. Tidal recruitment supplied by pressure support, on the other hand, may contribute not only to improved oxygenation but also to lung damage.

Objective:

To observe if Continuous positive airway pressure (CPAP) was the most effective way to reduce mortality and endotracheal intubation in patients with de novo AHRF.

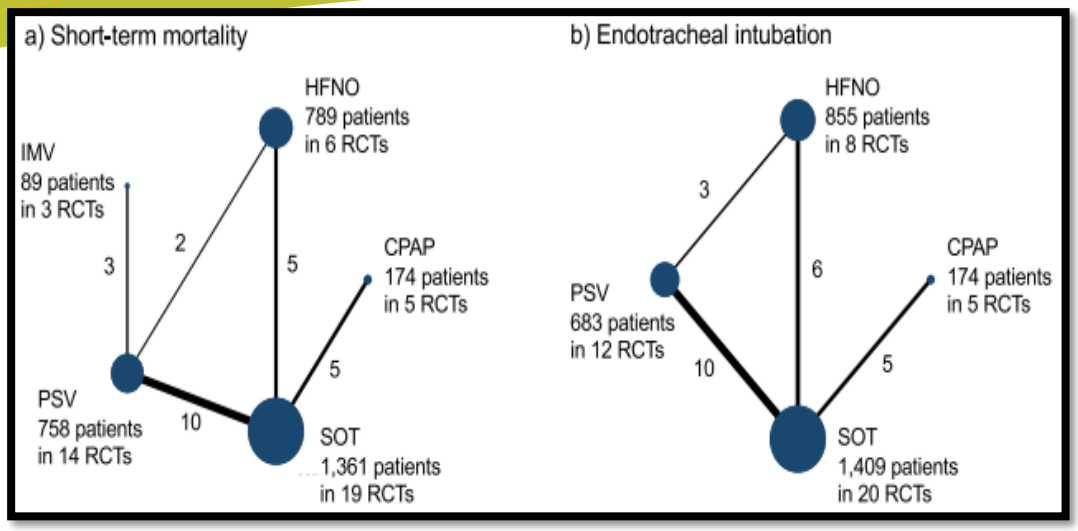
Methods:

The databases searched were the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, and Ichushi. RCTs comparing two different respiratory management techniques (continuous positive airway pressure (CPAP), pressure support ventilation (PSV), HFNO, SOT, or IMV) were reviewed in studies including individuals with AHRF.

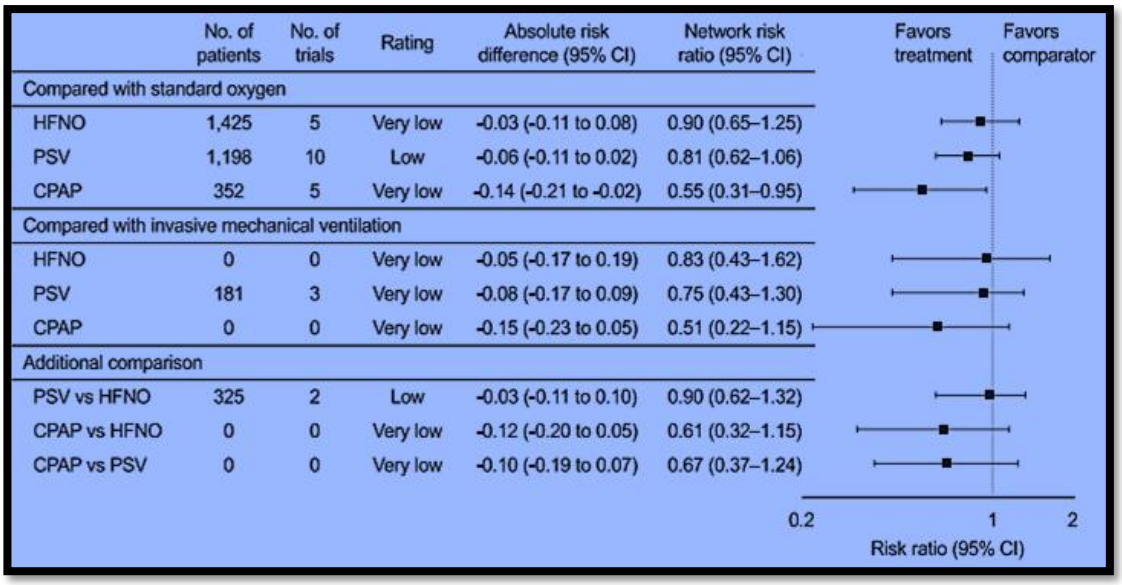
Results:

A total of 25 RCTs were included in the study (3,302 participants: 27 comparisons). CPAP (risk ratio [RR] 0.55; 95 percent confidence interval [CI] 0.31–0.95; extremely low certainty) was significantly related with a decreased risk of death when compared to SOT. PSV (RR 0.81; 95 percent CI 0.62–1.06; poor certainty) and HFNO (RR 0.90; 95 percent CI 0.65–1.25; very low certainty) were not significantly linked with a lower risk of death when compared to SOT. Although the certainty of evidence was very poor, no non-invasive respiratory treatment was associated with a significantly decreased risk of mortality when compared to IMV. CPAP had the highest chance of lowering short-term mortality among all feasible therapies, followed by PSV and HFNO, with IMV and SOT tied for last place (surface under the cumulative ranking curve values: 93.2, 65.0, 44.1, 23.9, and 23.9, respectively).

Network plot for non-invasive respiratory management strategies for adults with AHRF

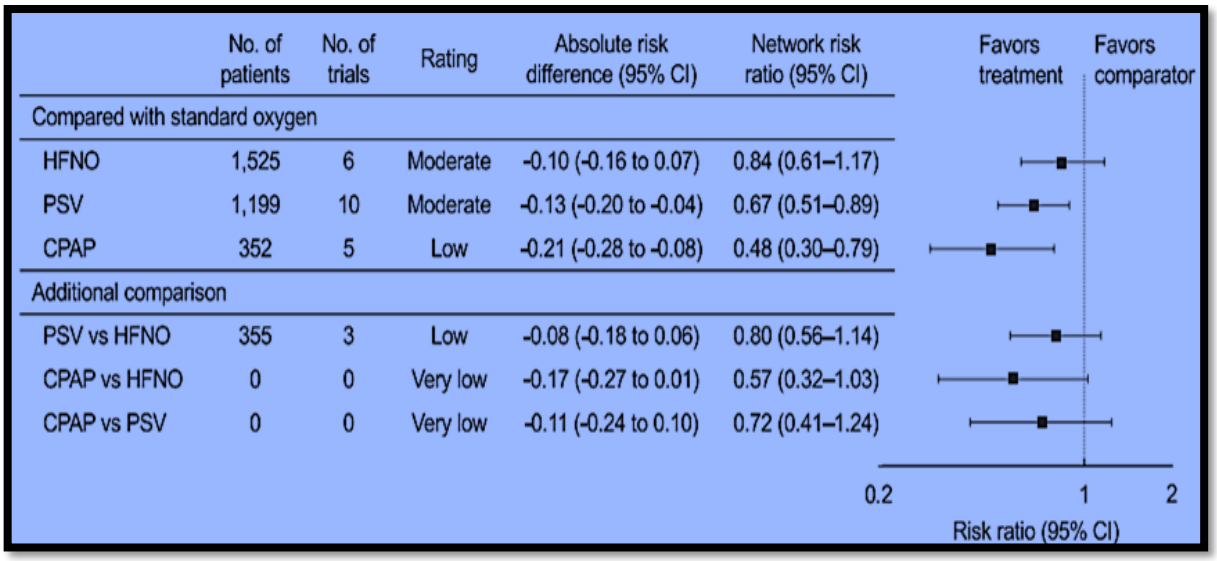

a) Short-term mortality
HFNO
789 patients
in 6 RCTs
IMV
89 patients
in 3 RCTs
CPAP
174 patients
in 5 RCTs
PSV
758 patients
in 14 RCTs
SOT
1,361 patients
in 19 RCTs
3
2
5
5
10
b) Endotracheal intubation
HFNO
855 patients
in 8 RCTs
CPAP
174 patients
in 5 RCTs
PSV
683 patients
in 12 RCTs
SOT
1,409 patients
in 20 RCTs
3
6
10
5

Forest plots for association of non-invasive respiratory management strategies with primary outcomes and short-term mortality



	No. of patients	No. of trials	Rating	Absolute risk difference (95% CI)	Network risk ratio (95% CI)
Compared with standard oxygen					
HFNO	1,425	5	Very low	-0.03 (-0.11 to 0.08)	0.90 (0.65–1.25)
PSV	1,198	10	Low	-0.06 (-0.11 to 0.02)	0.81 (0.62–1.06)
CPAP	352	5	Very low	-0.14 (-0.21 to -0.02)	0.55 (0.31–0.95)
Compared with invasive mechanical ventilation					
HFNO	0	0	Very low	-0.05 (-0.17 to 0.19)	0.83 (0.43–1.62)
PSV	181	3	Very low	-0.08 (-0.17 to 0.09)	0.75 (0.43–1.30)
CPAP	0	0	Very low	-0.15 (-0.23 to 0.05)	0.51 (0.22–1.15)
Additional comparison					
PSV vs HFNO	325	2	Low	-0.03 (-0.11 to 0.10)	0.90 (0.62–1.32)
CPAP vs HFNO	0	0	Very low	-0.12 (-0.20 to 0.05)	0.61 (0.32–1.15)
CPAP vs PSV	0	0	Very low	-0.10 (-0.19 to 0.07)	0.67 (0.37–1.24)

Forest plots for association of non-invasive respiratory management strategies with secondary outcomes and endotracheal intubation



	No. of patients	No. of trials	Rating	Absolute risk difference (95% CI)	Network risk ratio (95% CI)
Compared with standard oxygen					
HFNO	1,525	6	Moderate	-0.10 (-0.16 to 0.07)	0.84 (0.61–1.17)
PSV	1,199	10	Moderate	-0.13 (-0.20 to -0.04)	0.67 (0.51–0.89)
CPAP	352	5	Low	-0.21 (-0.28 to -0.08)	0.48 (0.30–0.79)
Additional comparison					
PSV vs HFNO	355	3	Low	-0.08 (-0.18 to 0.06)	0.80 (0.56–1.14)
CPAP vs HFNO	0	0	Very low	-0.17 (-0.27 to 0.01)	0.57 (0.32–1.03)
CPAP vs PSV	0	0	Very low	-0.11 (-0.24 to 0.10)	0.72 (0.41–1.24)

Conclusion:

It is critical to avoid excessive tidal volume and lung injury when practising non-invasive ventilation in individuals with de novo AHRF. Although some of these patients require pressure support, it should be used with caution because it might produce excessive tidal volume and lung injury.

Reference:

Sakuraya M, Okano H, Masuyama T, Kimata S, Hokari S. Efficacy of non-invasive and invasive respiratory management strategies in adult patients with acute hypoxaemic respiratory failure: a systematic review and network meta-analysis. Crit Care. 2021 Nov 29;25(1):414.