Section S1

About the **population**:

According to the criteria developed in 2005 by the National Institute of Child Health and Human Development Workshop, preterm Infants are those who were born with a gestational age of less than 37 weeks. [1]

About the **condition**:

The incidence of respiratory distress syndrome (RDS) in premature infant is proportionally increased as the gestational age of the baby decreased. [2] A preterm infant could experience apnea due to the immature development of the lung and reduced production of surfactant; moreover, the reduced of rib cage compliance, floppy airways, and immature responsiveness of respiratory centers and chemoreceptors are additional etiologies to the respiratory failure. [3]

About the **intervention**:

As opposed to any other method of support that relied on pressure to deliver non-invasive respiratory support, NIV-NAVA utilized electrical diaphragm activity to initiate and assist inspiratory effort. Any non-invasive respiratory support system that continuously maintains positive end expiratory pressure (> +1 cmH2O) with inspiratory support activated by electrical diaphragmatic activity and detected by transesophageal, subcutaneous, or transcutaneous sensors was considered NIV-NAVA in our study. [4]

About the **Ventilation** modes:

NCPAP

Regardless of flow rate or oxygen need, we defined non-invasive continuous positive end expiratory pressure at a specified pressure larger than +1 cmH2O as NCPAP.

NIPP

Non-invasive continuous positive end expiratory pressure (NIPPV) was defined as continuous positive end expiratory pressure (nCPAP) with any extra inspiratory support, either not synchronized with breathing or activated by mechanisms other than electrical diaphragm activity.

Section S2

The following keywords were used for the systematic search:

1. exp Obstetric Labor, Premature/ or exp Premature Birth/ or exp Infant, Premature/ or exp Infant, Newborn/
2. Premature$.mp.
3. Infant$.mp.
4. Newborn$.mp.
5. exp Respiratory Distress Syndrome/
6. Respiratory Distress Syndrome$.mp.
7. Respiratory Distress$.mp.
8. exp Birth Weight/
9. Low birth weight$.mp.
10. Neonatal lung disease$.mp.
11. exp Intubation, Intratracheal/ or exp Intubation/
12. Intubation$.mp.

13. Mechanical ventilation$.mp.

14. exp Ventilator Weaning/

15. Ventilator weaning$.mp.

16. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15

17. Neurally adjusted ventilation$.mp.

18. Neurally adjusted ventilatory assist$.mp.

19. 12 or 13

20. Respiration, Artificial / or exp Noninvasive Ventilation/

21. Noninvasive ventilation$.mp.

22. exp Interactive Ventilatory Support/

23. exp Positive-Pressure Respiration/ or exp Continuous Positive Airway Pressure/

24. Continuous positive airway pressure$.mp.

25. exp Intermittent Positive-Pressure Ventilation/

26. Intermittent positive-pressure ventilation$.mp.

27. 15 or 16 or 17 or 18 or 19 or 20 or 21

28. exp Randomized Controlled Trial/ or exp Clinical Trial/

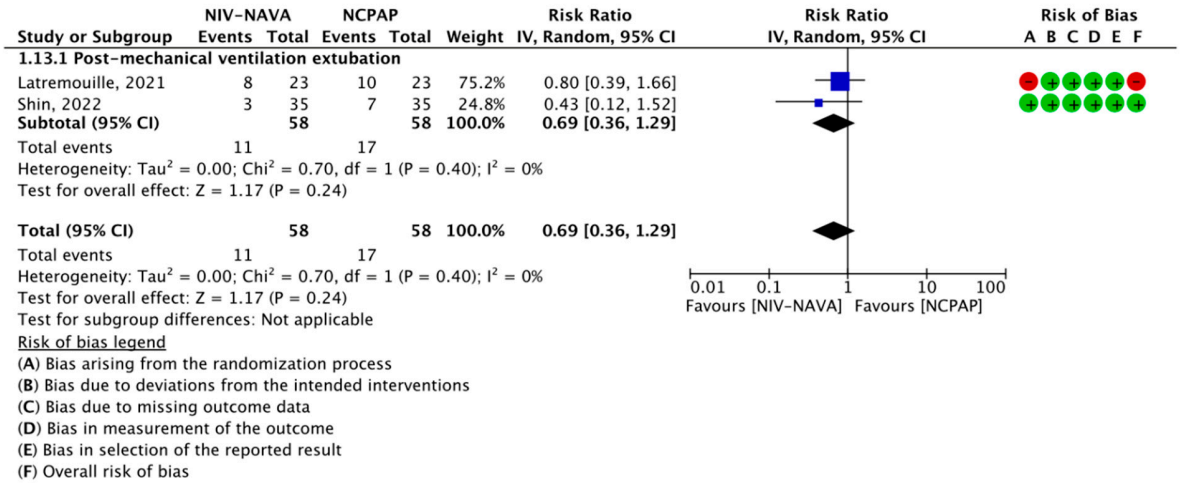
29. Trial$.mp.

30. 23 or 24

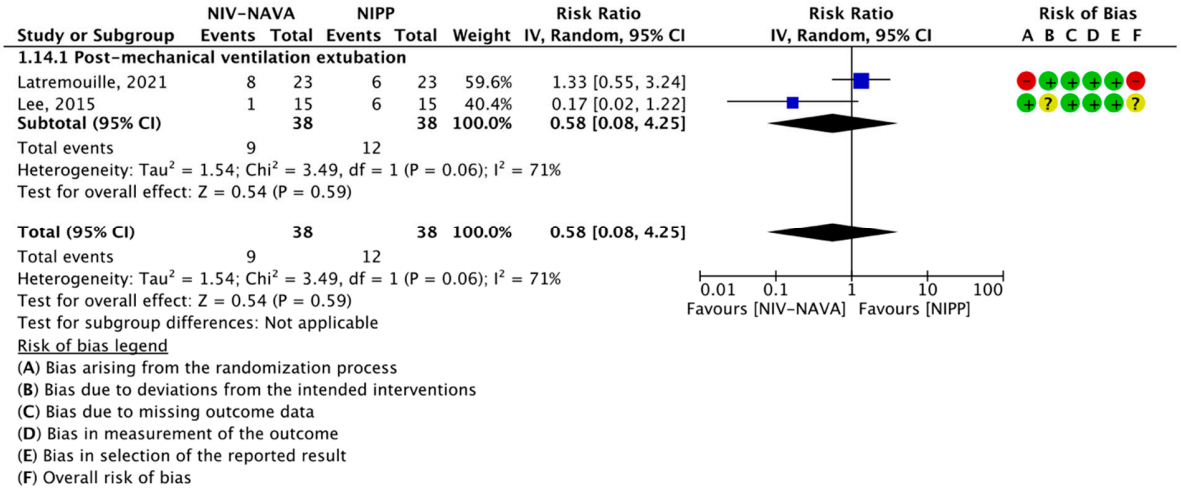
31. 16 and 19 and 27 and 30

Section S3: Supplementary Outcomes

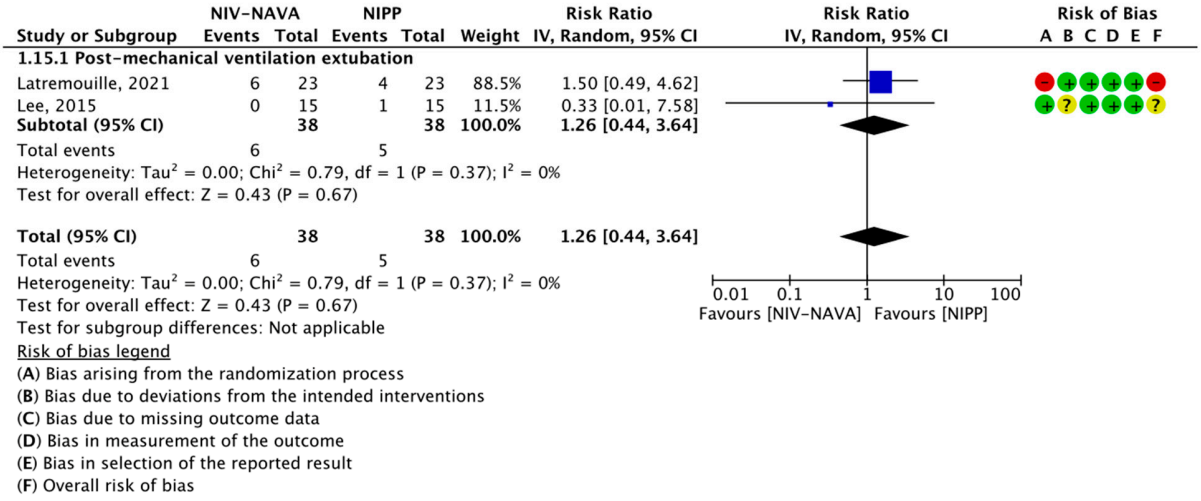
Supplementary Figure S1: Comparison Between NIV- NAVA Versus NCPAP, outcome "Desaturation"



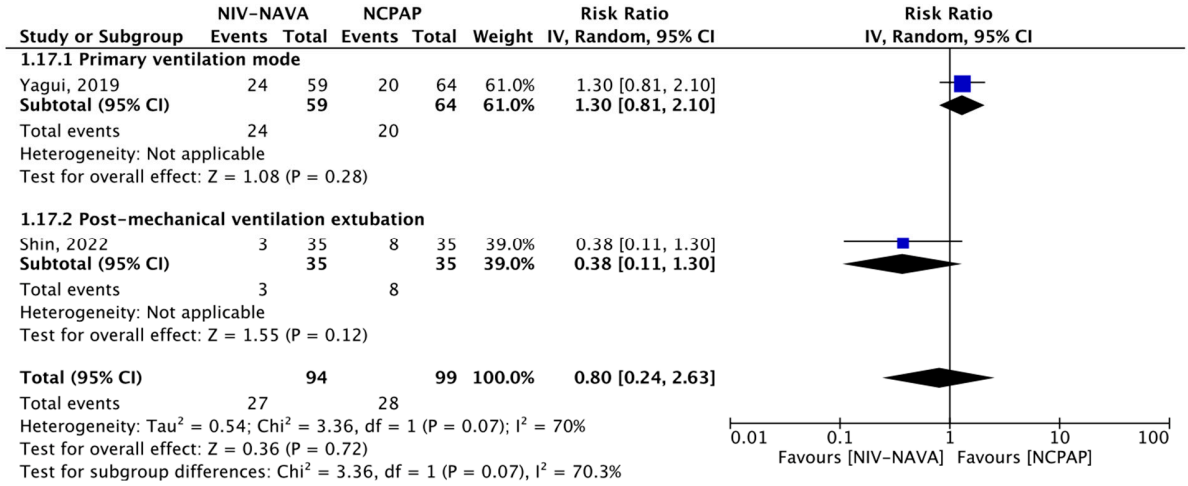
Supplementary Figure S2: Comparison Between NIV- NAVA Versus NIPP, outcome "Desaturation"



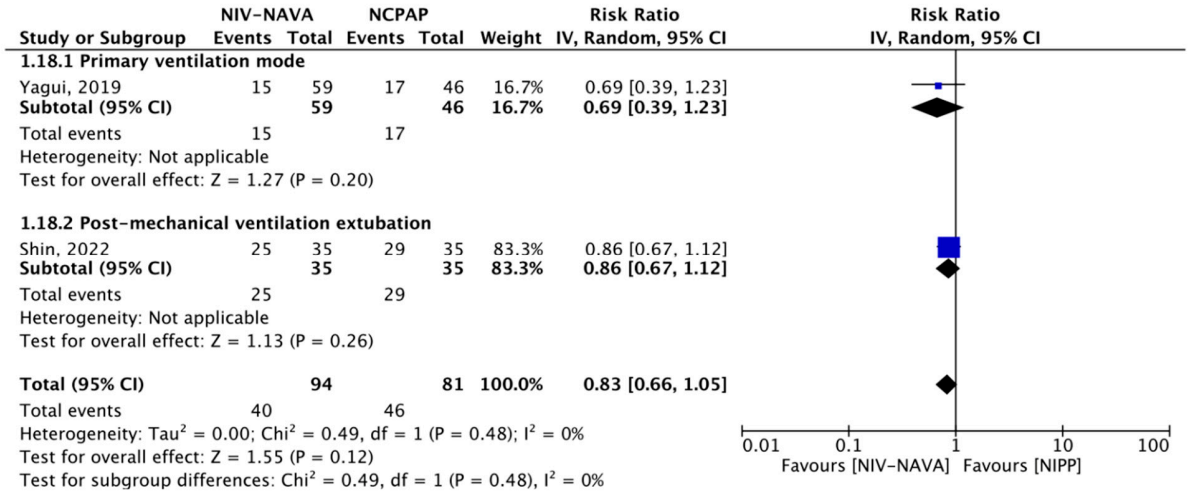
Supplementary Figure S3: Comparison Between NIV- NAVA Versus NIPP, outcome "Bradycardia"



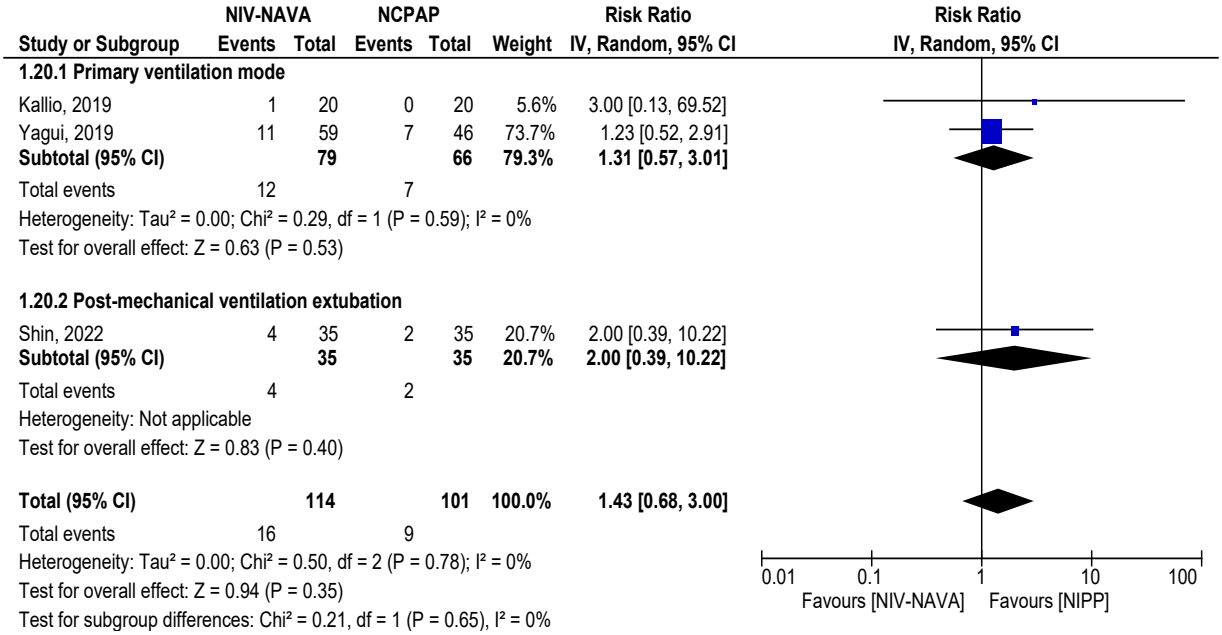
Supplementary Figure S4: Comparison Between NIV- NAVA Versus NCPAP, outcome "Apnea"



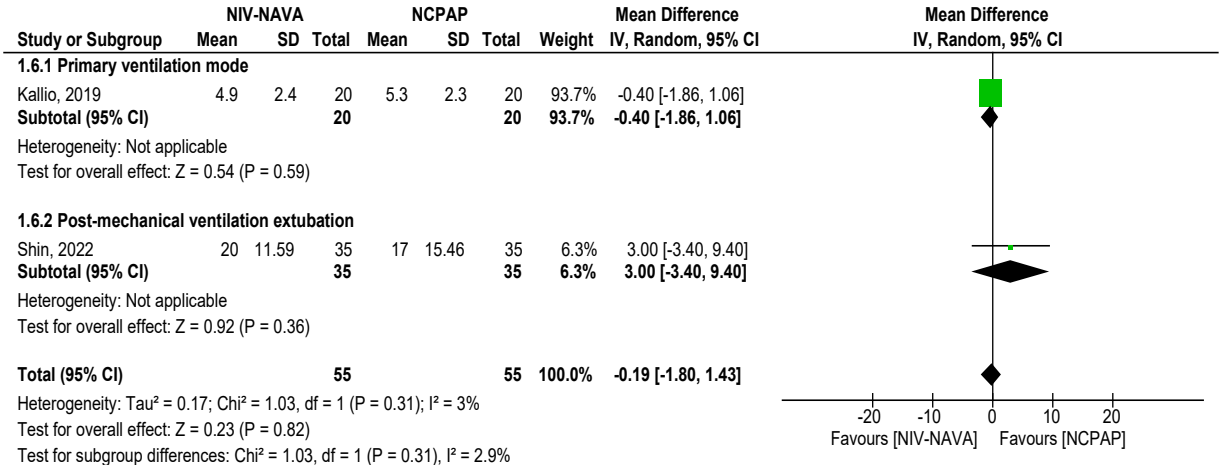
Supplementary Figure S5: Comparison Between NIV- NAVA Versus NCPAP, outcome "Patent ductus arteriosus (PDA)"



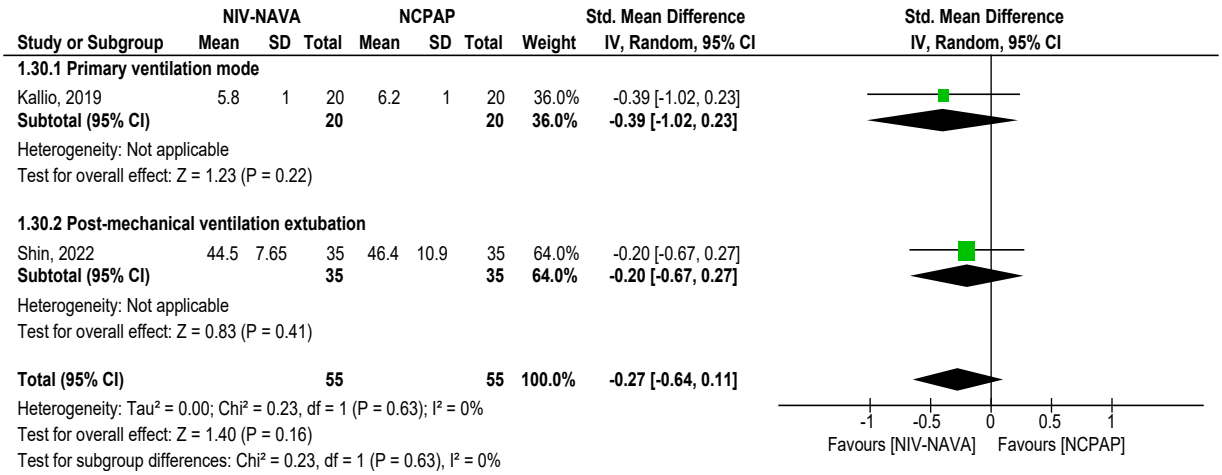
Supplementary Figure S6: Comparison Between NIV- NAVA Versus NCPAP, outcome "Intraventricular hemorrhage (IVH)"



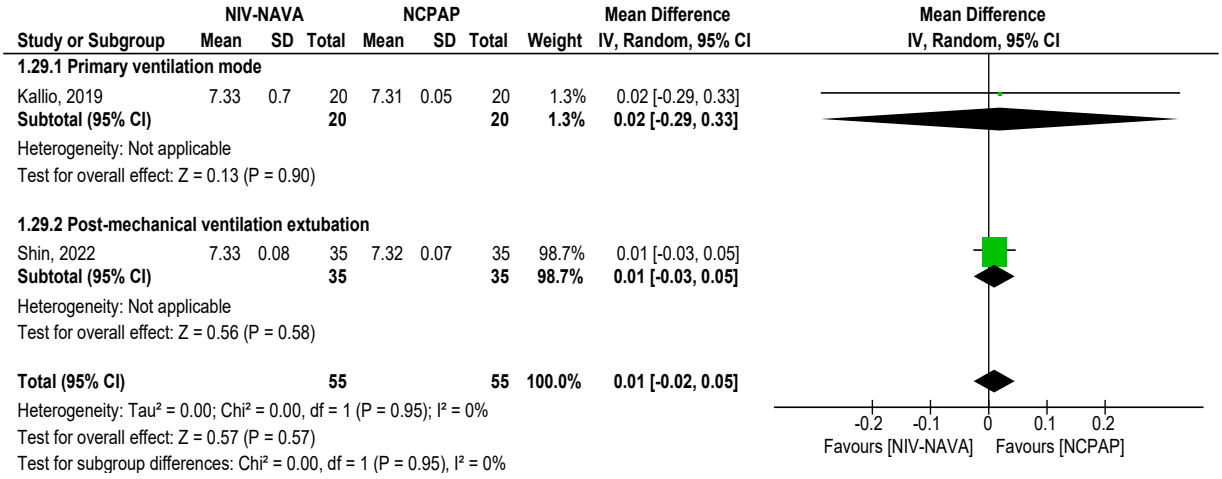
Supplementary Figure S7: Comparison Between NIV- NAVA Versus NCPAP, outcome "Mean time to full enteral feeding (days)"



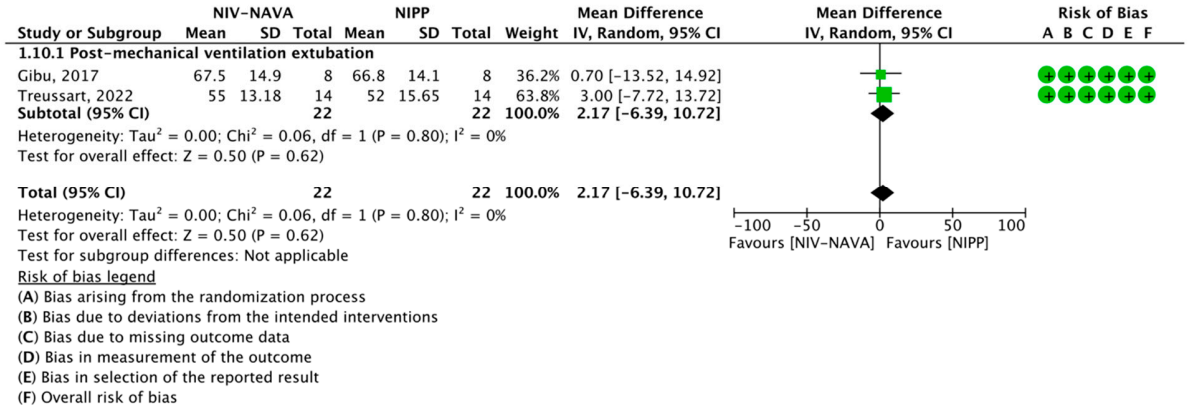
Supplementary Figure S8: Comparison Between NIV- NAVA Versus NCPAP, outcome "Mean pCO2"



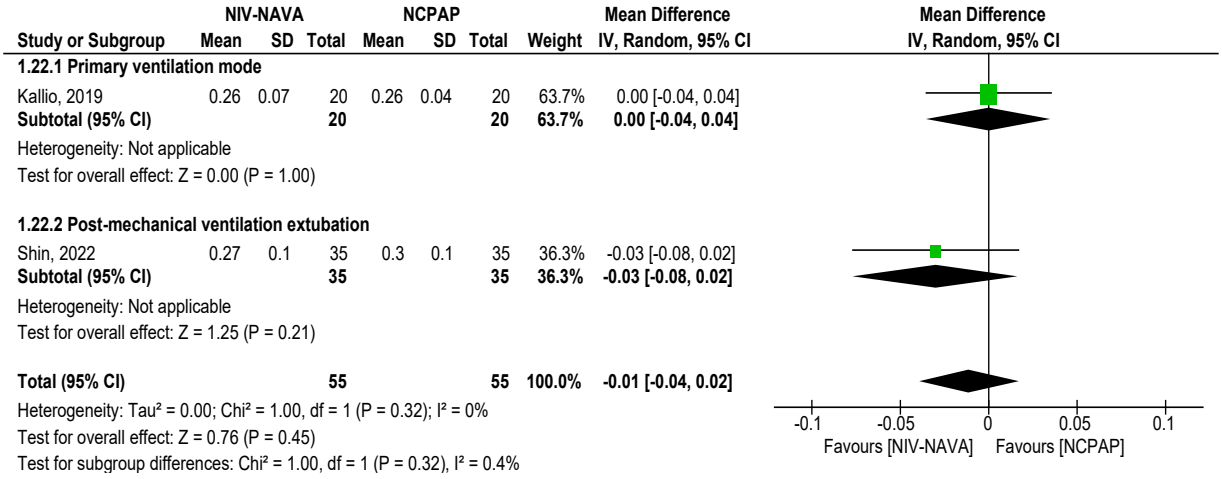
Supplementary Figure S9: Comparison Between NIV- NAVA Versus NCPAP, outcome "Mean pH"



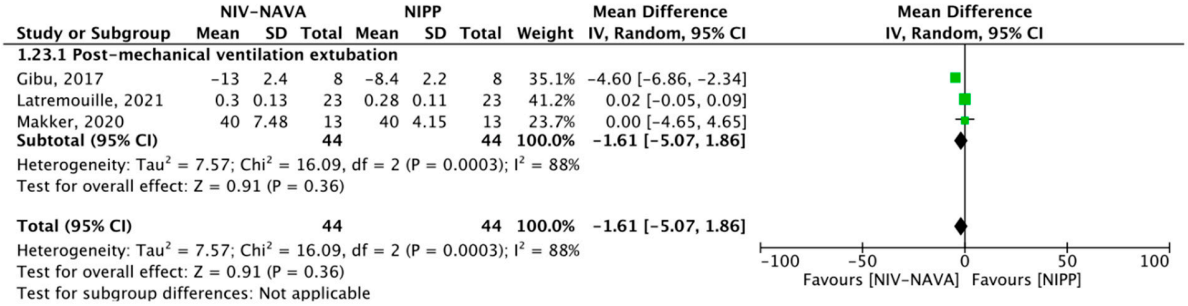
Supplementary Figure S10: Comparison Between NIV- NAVA Versus NIPP, outcome "Respiratory rate (RR)"



Supplementary Figure S11: Comparison Between NIV- NAVA Versus NCPAP, outcome "Fraction of inspired oxygen (FiO_2)"



Supplementary Figure S12: Comparison Between NIV- NAVA Versus NIPP, outcome "Fraction of inspired oxygen (FiO_2)"



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1. Raju TN, Higgins RD, Stark AR, Leveno KJ. Optimizing care and outcome for late-preterm (near-term) infants: a summary of the workshop sponsored by the National Institute of Child Health and Human Development. *Pediatrics*. 2006; 118(3):1207-14.
2. Bolisetty S, Legge N, Bajuk B, Lui K. Preterm infant outcomes in New South Wales and the Australian Capital Territory. *Journal of Paediatrics and Child Health* 2015;**51**(7):713-21. [DOI: 10.1111/ jpc.12848; PUBMED: 25644196]
3. Darnall RA. The role of CO(2) and central chemoreception in the control of breathing in the fetus and the neonate. *Respiratory Physiology & Neurobiology* 2010;**173**(3):201-12. [DOI: 10.1016/ j.resp.2010.04.009; PUBMED: 10.1016/j.resp.2010.04.009]
4. Beck J, Brander L, Slutsky AS, Reilly MC, Dunn MS, Sinderby C. Non-invasive neurally adjusted ventilatory assist in rabbits with acute lung injury. *Intensive Care Medicine* 2008;**34**(2):316-23. [DOI: 10.1007/s00134-007-0882-x; PUBMED: 17960364]