



015

Interfaces for noninvasive ventilation for adult critically ill patients in the intensive care unit: a systematic review and network meta-analysis

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Category: Pneumology

DOI: [10.31744/einstein_journal/2024ABS_EISIC_MV015](https://doi.org/10.31744/einstein_journal/2024ABS_EISIC_MV015)

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Introduction: The use of interfaces for non-invasive ventilation (NIV) is of great importance in adult patients admitted to the intensive care unit (ICU). The choice of interface for NIV is crucial as it directly affects patient comfort, tolerance and effectiveness of therapy. **Objectives:** This systematic review and network meta-analysis compare the effectiveness of interfaces in the treatment of patients with exacerbated acute or chronic respiratory failure requiring NIV in the ICU. **Methods:** The last search was performed on June 6, 2024 at MEDLINE, CENTRAL, EMBASE, and LILACS databases. Only parallel randomized controlled

trials (RCTs) were included. The study protocol was registered on PROSPERO [CRD42022345068]. The outcomes evaluated were intubation, ICU and hospital length of stay, in-hospital mortality, severe adverse events, moderate and mild adverse events, comfort, overall hospital costs, tolerance and adherence. Direct comparisons were carried out in the Review Manager 5 software. Risk ratios (RR) with 95% confidence interval (95%CI) or credible interval (CrI) were used for dichotomous outcomes. Continuous outcomes were reported as mean differences (MD) with 95% CIs. For conducted network meta-analysis (NMA) the MetaInsigh software was used with Bayesian random-effects model. **Results:** Our search strategy yielded a total of 2,119 records. At the end of the analysis, 7 studies from 8 reports were included, with a total of 406 adult participants. For ICU length of stay, full face mask and helmet compared to oral nasal mask can reduce length of stay [MD with 95% CrI - 4.08 (-11.31 to 3.35); -3.34 (-6 to 0.49)], and the helmet can reduce hospital stay [MD with 95% CrI -2.4 (-6.23 to 1.62)]. Furthermore, helmet use may reduce serious adverse events compared to oral-nasal mask RR 0.38 [95% CrI, 0.1 to 1.38]. For intubation, the evidence is very uncertain about the difference between using a full-face mask *versus* helmet, RR 1.04 [95% CrI, 0.09 to 10.44], *versus* nasal mask, RR 0.49 [95% CrI 0.03 to 8.12], and *versus* oronasal mask, RR 0.39 [95% CrI, 0.03 to 4.42]. For in-hospital mortality, the NMA results suggest that there may be no clinically important difference between the interfaces. There may be a reduction in the incidence of serious adverse events with helmet use compared with oronasal use, RR 0.38 [95% CrI, 0.1 to 1.38], although there is inaccuracy in the estimates. Only 2 studies evaluated comfort, of which one study showed that the helmet may be more comfortable than the oronasal mask, and another study compared nasal and nasal oral masks with little or no difference between the groups. The helmet may increase tolerance to NIV therapy when compared to an oral nasal mask, RR 1.36 [95% CrI, 0.90 to 2.08]. **Conclusions:** The present NMA

demonstrated that the helmet is an alternative interface of non-invasive ventilation for critically ill patients. Our finding should be interpreted with caution as it generates from RCT with small sample sizes.

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