High-Flow Nasal Oxygen Therapy in Preventing Post-Extubation Hypoxaemia and Postoperative Pulmonary Complications: A Systematic Review and Meta-Analysis †

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Abstract

Background: Post-extubation hypoxaemia and postoperative pulmonary complications (PPCs) are common in surgical patients and contribute significantly to morbidity and prolonged recovery. High-flow nasal oxygen therapy (HFNOT) has been proposed as an alternative to conventional oxygen therapy (COT) in improving oxygenation and reducing PPCs postoperatively. Objectives: To evaluate the effectiveness of HFNOT compared to COT in reducing post-extubation hypoxaemia and PPCs in adult surgical patients, and to assess its impact on other clinical outcomes including ICU and hospital length of stay, mortality, and the need for escalation of respiratory support. Methods: A systematic review and meta-analysis of randomized controlled trials was conducted following

PRISMA guidelines. Studies were identified from five databases including PubMed, Scopus, EBSCOHost, ProQuest, Ovid MEDLINE and Web of Science. Adult postoperative patients who received HFNOT after extubation were compared to those receiving COT. Primary outcomes included PaO_2/FiO_2 (PF) ratio and incidence of PPCs. Secondary outcomes were hospital and ICU length of stay, mortality, and need for escalation of therapy. Results: Seventeen trials comprising 1830 patients were included. HFNOT significantly improved PF ratio post-extubation and reduced the incidence of hypoxaemia and PPCs compared to COT. For secondary outcomes, HFNOT was associated with a reduced hospital length of stay and lower postoperative mortality, while no significant difference was found for ICU stay. Escalation of respiratory support was more frequent in the COT group. Subgroup analyses indicated greater improvements in oxygenation with HFNOT of shorter duration (<24 h) and in non-cardiothoracic patients. Conclusions: HFNOT is associated with improved postoperative oxygenation and a reduction in respiratory complications following extubation in surgical patients. The most pronounced benefits were observed in non-cardiothoracic populations and with short-duration applications. While the beneficial effects of HFNOT appear consistent across the included randomized controlled trials, further large-scale studies with standardized intervention durations, surgical populations, and clearly defined criteria for escalation of therapy are needed to strengthen and confirm these findings.

Author keywords

extubation; high-flow nasal oxygen; hypoxaemia; postoperative; pulmonary complications

Indexed keywords

EMTREE drug terms

oxygen

EMTREE medical terms

abdominal surgery; adult; aged; assisted ventilation; bariatric surgery; clinical outcome; colorectal surgery; controlled study; extubation; gynecologic surgery; heart surgery; high flow nasal cannula therapy; Horowitz index; human; hypoxemia; intensive care unit; intermethod comparison; length of stay; meta analysis; mortality; mortality rate; orthopedic surgery; oxygen saturation; oxygen therapy; oxygenation; postoperative lung complication; randomized controlled trial (topic); Review; surgical mortality; systematic review; thorax surgery

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