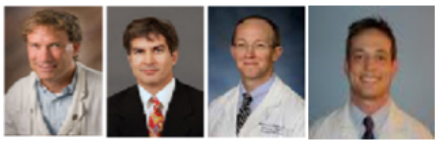
critical care perspectives in emergency medicine



High-Flow or Standard Oxygen?

Key Article

- *Frat JP, et al. High-flow or standard oxygen in acute hypoxemic respiratory failure. N Engl J Med. 2026; published online March 17, 2026.*

Background

- Acute respiratory failure is the leading cause of admission to the ICU.
- Acute hypoxemic respiratory failure in the absence of cardiogenic pulmonary edema or chronic respiratory diseases is primarily caused by viral or bacterial pneumonia.
- O2 is the first-line therapy for acute hypoxemic respiratory failure and can be given with a standard NRB mask, with high-flow through a nasal cannula, or with NIV.
- The primary goal of managing acute hypoxemic respiratory failure is to avoid intubation.
- Standard O2 is limited in its ability to provide high levels of FiO2 and to unload respiratory effort.
- In contrast, high-flow oxygen and NIV improve oxygenation and relieve patient effort and dyspnea.
- Current guidelines recommend the use of high-flow oxygen rather than NIV or standard oxygen as first-line for acute hypoxemic respiratory failure with respect to a reduced risk of intubation, although results on mortality are less consistent.
- To address the lack of evidence on whether high-flow is superior to standard oxygen in reducing mortality, these authors conducted the SOHO Trial…

Objective

- To compare two oxygenation strategies (high flow vs. standard O2) in patients who were admitted to an ICU for acute hypoxemic respiratory failure.

Methods

- Investigator-initiated, open-label, RCT
- 42 ICUs in France
- Patients - Included
    - Adults greater than or equal to 18 years of age
    - Admitted to the ICU with acute hypoxemic respiratory failure
        - RR > 25 bpm
        - Pulmonary infiltrates on CXR
        - P/F of 200 or less while breathing O2 at 10 L/min through a NRB
- Patients – Excluded
    - PaCO2 > 45 mm Hg
    - COPD exacerbation
    - Chronic lung disease with long-term O2
    - Cardiogenic pulmonary edema
    - Hemodynamically unstable

    - Altered mental status
    - Need for emergent intubation
    - DNR
- Randomization
    - Within the first 3 hours of meeting inclusion criteria
    - 1:1 to High-Flow Group or Standard Oxygen Group
    - High-Flow Group
        - Flow rate of at least 50 L/min
        - FiO2 adjusted to maintain SpO2 92-96%
        - Provided for at least 48 hours
        - After 48 hours, could be stopped and switched to standard O2 if the RR < 25 bpm and SpO2 of at least 92% with an FiO2 of 40% or less
    - Standard Oxygen Group
        - O2 delivered through a NRB with O2 set at 10 L/min or more
        - Adjusted to maintain an SpO2 92-96%
- Primary Outcomes
    - 28-day all-cause mortality
- Secondary Outcomes
    - Endotracheal intubation at day 28
    - Interval between randomization and intubation
    - Ventilator free days
    - ICU mortality, in-hospital mortality, 90-day mortality
    - ICU and hospital LOS
- To ensure consistency of intubation, investigators developed specified criteria
    - Severe respiratory failure
        - RR > 40 bpm
        - Respiratory muscle fatigue
        - pH < 7.35
        - P/F < 100 mm Hg despite 15 L/min
        - FiO2 of 80% or more
    - Recurrent episodes of SpO2 < 80%
    - SpO2 < 88% with maximal O2 support
    - Cardiac arrest
    - Hemodynamic instability
    - Deterioration of neurologic status
- Statistical Analysis
    - Calculated sample size of 1110 patients to provide 80% to show an absolute difference of 6% points in 28-day mortality

Results

- A total of 1,110 included in the ITT analysis
    - High-Flow Group: 556 patients
    - Standard Group: 554 patients
- Baseline characteristics
    - Well balanced except High-Flow Group had a higher % of men, higher median dyspnea score, and lower RR than Standard Group
    - Pneumonia was the leading cause of respiratory failure – 88%

        - Viral pneumonia in 53%
        - COVID-19 in 32%
- Interventions
    - High-Flow Group
        - Initial flow: 51 L/min
        - FiO2: 67%
    - Standard Group
        - Initial flow: 12 L/min
    - Both high-flow and standard O2 were delivered for a median of 4 days
    - NIV applied as rescue in 37 patients
- Primary Outcome
    - High-Flow Group: 14.6%
    - Standard Group: 14.6%
- Secondary Outcomes
    - Incidence of intubation at day 28
        - High-Flow Group: 42.4%
        - Standard Group: 48.4%
        - CI -11.78 to -0.08
    - High-Flow appeared to improve RR, CO2 values, and dyspnea scores
- Safety Outcomes
    - Pneumothorax
        - High-Flow Group: 10
        - Standard Group: 4
    - Cardiac Arrest
        - High-Flow Group: 3
        - Standard Group: 2

Limitations Identified by Authors

- Overall lower than expected mortality rate, which reduced the statistical power – could be due to the frequent use of steroids (62%)
- Trial did not have a DSMB
- High percentage of patients with viral pneumonia

Take Home Points

- The use of high-flow oxygen did not lower 28-day all-cause mortality in adult patients admitted to the ICU with acute hypoxemic respiratory failure.