Oxygen in Critically Ill Patients: Too Much of a Good Thing Might Do Harm

Daniel D. Dressler, MD, MSc, SFHM, FACP

Outcomes were worse with a conventional high-oxygenation goal than with a conservative moderate-oxygenation goal.

Increasingly, excess oxygen administration is recognized as a risk factor for adverse outcomes when used perioperatively (NEJM JW Infect Dis Nov 2009 and JAMA 2009; 302:1543) or after myocardial infarction (NEJM JW Hosp Med Aug 2015 and Circulation 2015; 131:2143). But is excessive oxygen harmful in the intensive care unit (ICU) setting?

In this open-label, single-center Italian trial, 480 adults who were admitted to the ICU with >3 days expected length of stay were randomized to receive either a conservative oxygen strategy (lowest possible fraction of inspired oxygen [FiO₂] to keep arterial oxyhemoglobin saturation [SpO₂] at 94%–98% or partial pressure of O₂ [PaO₂] at 70 mm Hg–100 mm Hg) or a conventional ICU oxygen protocol (FiO₂ ≥0.4 to keep SpO₂ at 97%–100% and PaO₂ ≤150 mm Hg). The study was stopped early (72% of planned recruitment) after an earthquake damaged the study hospital.

Patients in the conservative-oxygen group were significantly less likely to die in the ICU than were those in the standard-care group (12% vs. 20%; number needed to treat, 12) and had significantly lower likelihood of shock (4% vs. 11%), liver failure (2% vs. 6%), and bacteremia (5% vs. 10%), despite having only a moderately lower median PaO₂ than the standard-care group (87 mm Hg vs. 102 mm Hg).

Comment: The early trial halt, plus a slightly — although not statistically significantly — sicker standard-care patient group could have led to overestimation of benefits conferred by the conservative-oxygen protocol. Nevertheless, its impressive effect on ICU mortality should offer pause to aggressive oxygenation in critically ill patients. Although further study is necessary to define ideal oxygen-saturation targets, the most prudent strategy at the moment would be to maintain oxygen saturations between 94% and 98% in most ICU patients.

Citation(s):