

The Search for Optimal Oxygen Saturation Targets in Critically Ill Patients: Observational Data From Large ICU Databases

Willem van den Boom ¹, Michael Hoy ², Jagadish Sankaran ³, Mengru Liu ⁴, Haroun Chahed ⁵, Mengling Feng ⁶, Kay Choong See ⁷

Affiliations + expand

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Abstract

Background: Although low oxygen saturations are generally regarded as deleterious, recent studies in ICU patients have shown that a liberal oxygen strategy increases mortality. However, the optimal oxygen saturation target remains unclear. The goal of this study was to determine the optimal range by using real-world data.

Methods: Replicate retrospective analyses were conducted of two electronic medical record databases: the eICU Collaborative Research Database (eICU-CRD) and the Medical Information Mart for Intensive Care III database (MIMIC). Only patients with at least 48 h of oxygen therapy were included. Nonlinear regression was used to analyze the association between median pulse oximetry-derived oxygen saturation (SpO₂) and hospital mortality. We derived an optimal range of SpO₂ and analyzed the association between the percentage of time within the optimal range of SpO₂ and hospital mortality. All models adjusted for age, BMI, sex, and Sequential Organ Failure Assessment score. Subgroup analyses included ICU types, main diagnosis, and comorbidities.

Results: The analysis identified 26,723 patients from eICU-CRD and 8,564 patients from MIMIC. The optimal range of SpO₂ was 94% to 98% in both databases. The percentage of time patients were within the optimal range of SpO₂ was associated with decreased hospital mortality (OR of 80% vs 40% of the measurements within the optimal range, 0.42 [95% CI, 0.40-0.43] for eICU-CRD and 0.53 [95% CI, 0.50-0.55] for MIMIC). This association was consistent across subgroup analyses.

Conclusions: The optimal range of SpO₂ was 94% to 98% and should inform future trials of oxygen therapy.