

Oxygen reserve index for non-invasive early hypoxemia detection during endotracheal intubation in intensive care: the prospective observational NESOI study

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Background: To evaluate the ability of the oxygen reserve index (ORI) to predict the occurrence of mild hypoxemia (defined as SpO₂ < 97%) during endotracheal intubation (ETI) of patients in the intensive care unit (ICU).

Methods: This observational single-centre study included patients without hypoxemia (defined as SpO₂/FiO₂ > 214) who required ETI in the ICU. Patients were followed during preoxygenation and ETI then until hospital discharge and/or day 28. We recorded cases of mild hypoxemia, moderate (SpO₂ < 90%) and severe (SpO₂ < 80%) hypoxemia, moderate arterial hypotension (systolic arterial pressure < 90 mmHg), oesophageal intubation, aspiration, cardiac arrest, and death.

Results: Between January 2019 and July 2020, 56 patients were included prospectively and 51 patients were analysed. Twenty patients had mild hypoxemia between the end of preoxygenation and the end of intubation; in 10 of these patients, the decrease in SpO₂ below 97% was preceded by an ORI < 0.4, the median time difference being 81 s [interquartile range, 34-146]. By multivariable analysis, a higher ORI (by 0.1 increase) value during preoxygenation was associated with absence of hypoxemia (odds ratio, 0.76; 95% confidence interval, 0.61;0.95; P = 0.0141).

Conclusion: In non-hypoxemic patients, the 81-s [34-146] median time between the ORI decrease below 0.4 and the SpO₂ decrease below 97% during apnoea may allow preventive action. A higher ORI value during preoxygenation was independently protective against hypoxemia. Whether these findings also apply to hypoxemic patients, and the clinical impact of a preoxygenation strategy based on ORI monitoring, remain to be evaluated prospectively. Trial Registration ClinicalTrial.gov, #NCT03600181.