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## Bag-Mask Ventilation during Tracheal Intubation of Critically Ill Adults

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### ABSTRACT

#### BACKGROUND

Hypoxemia is the most common complication during tracheal intubation of critically ill adults and may increase the risk of cardiac arrest and death. Whether positive-pressure ventilation with a bag-mask device (bag-mask ventilation) during tracheal intubation of critically ill adults prevents hypoxemia without increasing the risk of aspiration remains controversial.

#### METHODS

In a multicenter, randomized trial conducted in seven intensive care units in the United States, we randomly assigned adults undergoing tracheal intubation to receive either ventilation with a bag-mask device or no ventilation between induction and laryngoscopy. The primary outcome was the lowest oxygen saturation observed during the interval between induction and 2 minutes after tracheal intubation. The secondary outcome was the incidence of severe hypoxemia, defined as an oxygen saturation of less than 80%.

#### RESULTS

Among the 401 patients enrolled, the median lowest oxygen saturation was 96% (interquartile range, 87 to 99) in the bag-mask ventilation group and 93% (interquartile range, 81 to 99) in the no-ventilation group ( $P=0.01$ ). A total of 21 patients (10.9%) in the bag-mask ventilation group had severe hypoxemia, as compared with 45 patients (22.8%) in the no-ventilation group (relative risk, 0.48; 95% confidence interval [CI], 0.30 to 0.77). Operator-reported aspiration occurred during 2.5% of intubations in the bag-mask ventilation group and during 4.0% in the no-ventilation group ( $P=0.41$ ). The incidence of new opacity on chest radiography in the 48 hours after tracheal intubation was 16.4% and 14.8%, respectively ( $P=0.73$ ).

#### CONCLUSIONS

Among critically ill adults undergoing tracheal intubation, patients receiving bag-mask ventilation had higher oxygen saturations and a lower incidence of severe hypoxemia than those receiving no ventilation. (Funded by Vanderbilt Institute for Clinical and Translational Research and others; PreVent ClinicalTrials.gov number, NCT03026322.)

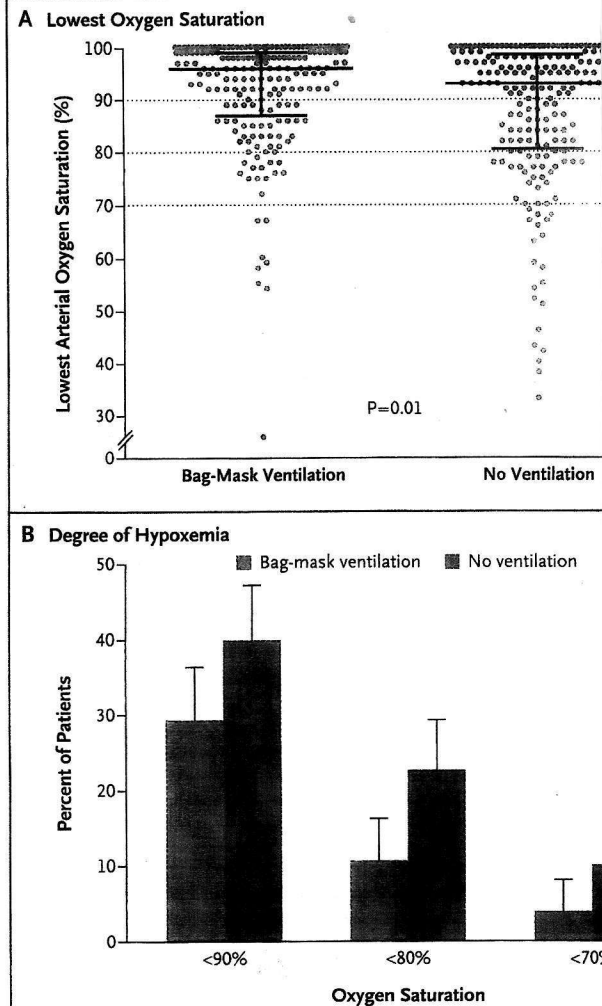


Figure 1. Lowest Oxygen Saturation.

Panel A shows the primary outcome of the lowest oxygen saturation (measured by continuous pulse oximetry) observed during the interval between induction and 2 minutes after tracheal intubation in patients receiving bag-mask ventilation (blue) and the no-ventilation group (dark blue). The widest horizontal bars represent median values, and the I bars represent the interquartile ranges. The dotted lines represent the thresholds for severe hypoxemia, severe hypoxemia, and very severe hypoxemia. Panel B shows the percentage of patients who had various degrees of hypoxemia in each group. The T bars represent the upper limit of the 95% confidence interval for the event rate.