

# Effects of Decreasing Fraction of Inspired Oxygen Concentration During General Anesthesia: An Integrated Research Review



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## INTRODUCTION

- Anesthesia providers have grown accustomed to using high FiO<sub>2</sub> levels during a general anesthetic.
- The number of patients experiencing absorption atelectasis due to the increase in FiO<sub>2</sub> levels are increasing.
- Although certain situations call for high FiO<sub>2</sub> levels, studies show that routine administration could have deleterious effects on patient outcomes.
- Many of these patients are experiencing post-operative complications such as:
  - Post-op atelectasis
  - Respiratory Failure
  - Need for re-intubation
  - Pulmonary edema
  - Pneumonia
- Taking this into account, further research is needed to evaluate the effects of high and low FiO<sub>2</sub> levels and how they impact a general anesthetic as well as patient outcomes

## OBJECTIVES

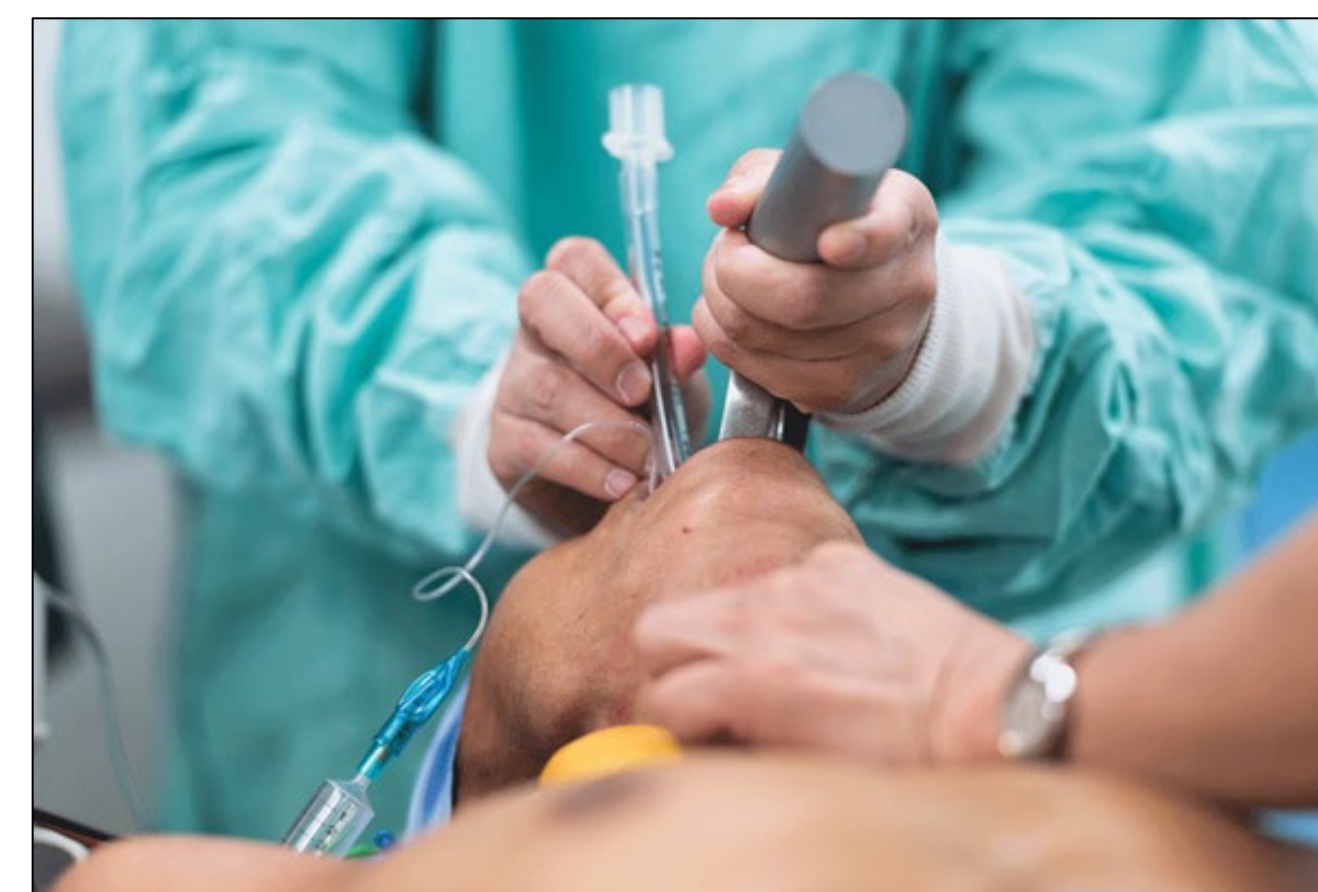
The objective of this study is to conduct an Integrated Research Review (IRR) to evaluate current evidence regarding reducing FiO<sub>2</sub> levels during general anesthesia in adult patients. This review will also examine the effects this will have on reducing atelectasis in the postoperative period.

## DESIGN & METHODS

An integrated research review (IRR) was conducted. Relevant sources for this review were obtained by searching electronic databases via Union University's library webpage as well as other online journals. Databases included PubMed, CINAHL, Google Scholar, and several anesthesia specific journals. Due to the limited research in this particular area, studies were limited to publication dates between 2000 and 2020. More specifically, ideal studies provided a general anesthetic to adult patients and provided high or low FiO<sub>2</sub> levels as an intervention during the induction, maintenance, or emergence phase of the anesthetic.

## RESULTS

- High FiO<sub>2</sub> levels promote atelectasis, alveolar hypoventilation, and decreased impaired exchange.
- Atelectasis, alveolar hypoventilation, and impaired gas exchange leads to an increased incidence of postoperative pulmonary complications.
- Administration of a FiO<sub>2</sub> level of 40-60% reduces atelectasis and postoperative pulmonary complications.
- Lower FiO<sub>2</sub> levels should be used during the maintenance phase of an anesthetic.
- Liberal use of postoperative oxygen can also lead to postoperative complications.
- IF the use of a high FiO<sub>2</sub> level is necessary, the use of PEEP, CPAP, and recruitment maneuvers could reduce the incidence of atelectasis and improve gas exchange.



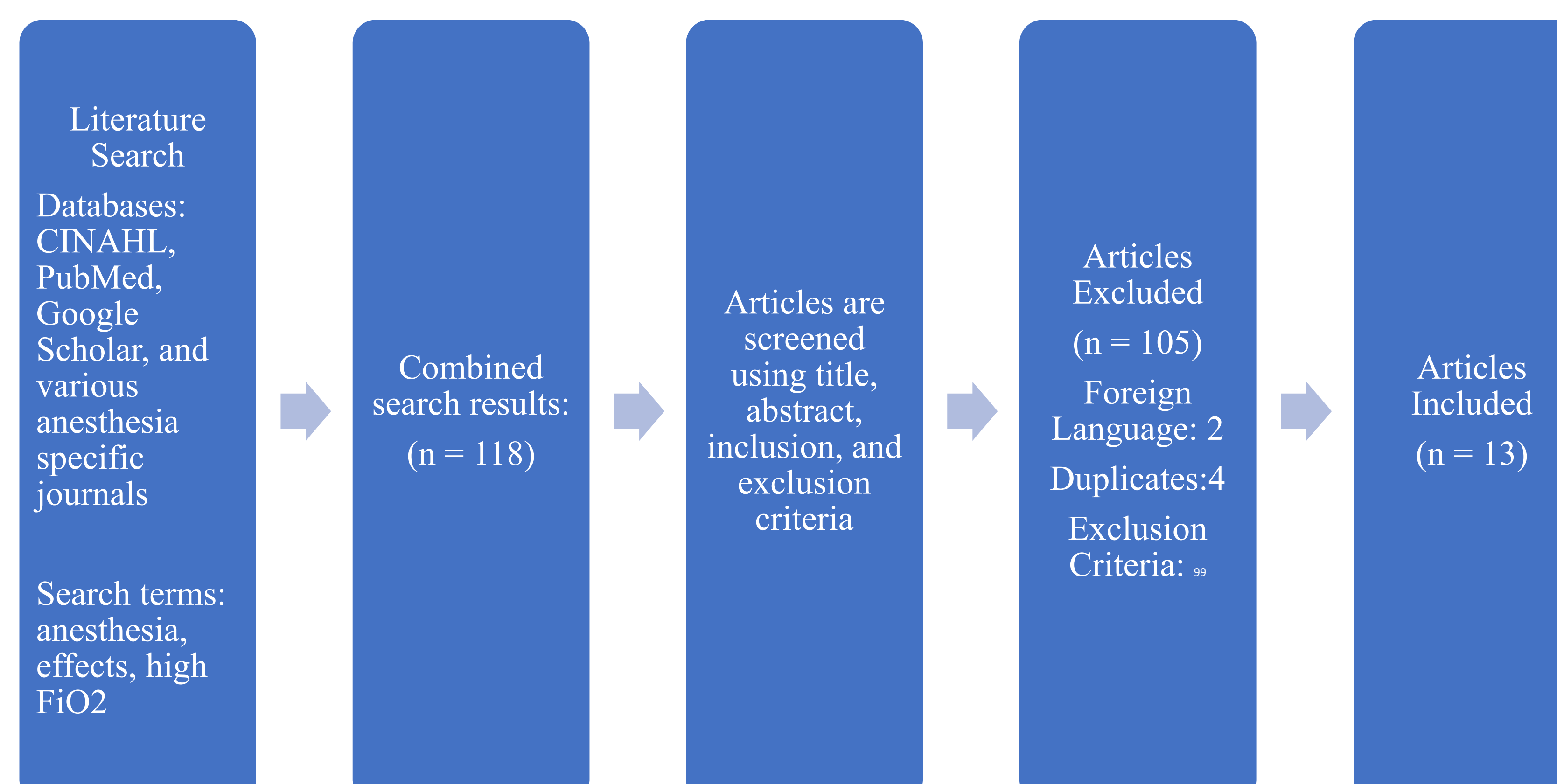
## DISCUSSION & CONCLUSION

- The most evident conclusion of this review is that the routine use of high FiO<sub>2</sub> levels can negatively affect patient outcomes.
- Once atelectasis occurs, patients begin to experience impaired V/Q, decreased lung compliance, increased PVR, acute lung injury, decreased coronary blood flow, and decreased cardiac output. If these events occur, the risk of developing a postoperative cardiopulmonary complication is extremely high.
- Overall, the most important take-away from this review is the need to individualize patient care. In each case, the FiO<sub>2</sub> level should be chosen based on patient history, assessment, and oxygen saturation during the procedure.

## IMPLICATIONS FOR CLINICAL PRACTICE

- Research suggests that 85-90% of patients experience atelectasis under general anesthesia
- One study implies that roughly 15-20% of patient's lungs are atelectic prior to the surgeon making incision.
- Although some situations warrant the use of high FiO<sub>2</sub> levels, routine administration is ill-advised.
- The use of PEEP, CPAP, and recruitment maneuvers can help decrease atelectasis and improve outcomes related to atelectasis in the postoperative period.

## STUDY SELECTION FLOWCHART



## References

