# COMPARING NASOTRACHEAL VS. OROTRACHEAL INTUBATION FOR PATIENTS IN THE INTENSIVE CARE


## ABSTRACT

All patients admitted to the intensive care unit require constant care and interventions, depending upon their condition. This is because nearly all the patients kept in the intensive care departments are in a very serious condition. Their prognosis could not be determined just by making them stay within the department. However, new interventions might be needed from time to time to ensure that the person is maintaining all vital signs and capacities to the best of their body's abilities. This, among the other factors involved in the equation, is one of the major goals that physicians working in the ICU settings must take care of and be aware of. The airway, amidst all the bodily systems and organs, is one of the most important features that must be secured and taken care of in the best possible way. The patency of the airway is what ultimately affects the rest of the systems and organs of the body, and thus, the utmost level of care must be taken to make sure that a patient has a secure, clear, and patent airway at all times. Airway management is also one of the first things ot be assessed and managed accordingly when reporting at an accident site. In the cases where a person's airway has been compromised or there is a risk of it getting compromised, immediate steps are taken to intubate the patient. Intubation not only helps clear and secure the airway but also helps stabilize the otherwise deteriorating condition of the patient to a greater extent. There are several techniques for intubating a patient, all depending upon their individual indications and conditions. This review, will, however, compare the effectiveness and safety of orotracheal and nasotracheal modes of intubation in patients. This review will serve as an exploratory guide to see which method of intubation is safer and more convenient when opting for patients with a compromised airway. It will help guide the

physicians to make an appropriate decision in times of need when there is an emergency related to the patient.

**Keywords:** intubation, nasotracheal, orotracheal, airway compromise, patent airways, effectiveness of intubation.

## INTRODUCTION

Airway management is one of the first and foremost priorities in patients with respiratory compromises. It becomes a matter of life or death for patients who are unable to maintain mechanical ventilation owing to their underlying diseases or conditions. It is not just about the inability to maintain mechanical ventilation but also the risk of collecting secretions and possible obstructions, or even respiratory failure as a result of that, which leads to the ultimate decision of intubating a patient in a provided clinical setting. (1)

It is also important to pay particular attention must be directed toward patients with obesity and pregnancy, as these conditions diminish functional residual capacity (FRC) and elevate the risk of atelectasis, a condition that considerably increases the risk of hypoxemia. (2)

However, the list of ‘at-risk’ patients extends further to encompass those who cannot safely endure even a mild degree of hypoxemia. Among these are individuals burdened by conditions such as epilepsy, cerebrovascular disease, coronary artery disease, and sickle cell disease, each representing a unique challenge in the delicate world of intubation and airway management.(3)

Throughout all the clinical settings and in particular the ICU, there exists a profound necessity for a provider to possess a comprehensive understanding of the intricate facts pertaining to the complexity of the airway. This expertise extends to encompass a thorough knowledge of the crucial anatomical, physiological, and pathological elements that influence the airway’s

functionality. Moreover, skilled practitioners must acquaint themselves with the diverse array of tools and techniques that have been meticulously developed for this very purpose.

Yet, the mastery of airway management entails more than just an understanding of its foundational aspects. It is equally important to be aware of the nuanced indications, contraindications, and potential complications associated with a procedure known as endotracheal intubation. This invasive procedure, used to secure and safeguard the airway, demands the provider's unwavering vigilance and adeptness.(4)

The indications for embarking upon the path of endotracheal intubation are manifold, each bearing the weight of critical decision-making. This path must be chosen when faced with the dire specter of respiratory failure, be it hypoxic suffocation or the looming threat of a hypercapnia crisis. The shadow of apnea, that perilous cessation of breathing, necessitates the same course of action. (5)

It is also in the presence of a diminished level of consciousness, often quantified by a Glasgow Coma Scale (GCS) score of less than or equal to 8, that the imperative for intubation becomes undeniable.

In the ever-changing landscape of medical exigencies, a rapid alteration in mental status serves as another essential indicator that the airway must be fortified. Airway injury, with its potential to descend into an impending airway crisis, likewise propels us toward intubation. Moreover, there exists a high risk of aspiration, that perilous inhalation of foreign material into the lungs, which becomes an immediate call to action.(6)

In all these dire circumstances, the need to secure and establish a definitive airway becomes vital. In the intricate tapestry of airway management, these indications weave the threads of

urgency, guiding the skilled provider toward the delicate and high-stakes art of endotracheal intubation.

## COMMONLY USED TECHNIQUES FOR ENDOTRACHEAL INTUBATION

There are several techniques employed for the endotracheal intubation of a patient in a clinical setting. These techniques largely depend on the patient's condition, the dire need for intubation, and the skills and expertise of the person doing the intubation. Depending upon these indications, intubation could be done as deemed necessary.

However, immense care must be taken to ensure that only the most skilled and expert technician performs the intubation to minimize any risks associated with intubation, and also take care of any complications that might be encountered during the process. (7)

Intubation, a procedure commonly undertaken in the medical field, involves the insertion of a tube into the trachea, often through the oral route with the aid of laryngoscopy. Prior to intubation, patients are pre-oxygenated, and they may receive narcotics and a muscle relaxant to facilitate the process and make it pain-free for the patient.(8)

However, as patients continue to receive mechanical ventilation following intubation, a delicate balance must be maintained. While sedation is frequently administered to ensure patients' tolerance of the orotracheal tube, it is also important to note that this approach may introduce a set of challenges. These challenges include an increased reliance on vasopressors to maintain blood pressure, a higher likelihood of delirium, the development of muscular weakness specific to critically ill patients, potential impairment of spontaneous breathing, limitations on physiotherapy, restricted patient mobility, and an elevated risk of mortality.(9)

In an effort to navigate these complexities and enhance patient comfort, an alternative approach is considered, and that is intubation via the nasotracheal route. This method, though less

commonly employed, has its sets of merits. It has been observed that patients who undergo nasotracheal intubation tend to require less sedation and fewer catecholamines (vasopressor medications). Additionally, they exhibit increased alertness and responsiveness.(10)

It is worth noting that while nasotracheal intubation was once widely abandoned due to concerns about potential sinusitis, this risk cannot be exclusively attributed to nasotracheal intubation alone. Similar concerns regarding sinusitis can also apply to orotracheal intubation.

In our medical institution, we have adopted a versatile approach, routinely utilizing both orotracheal and nasotracheal intubation techniques within the intensive care unit. This approach is grounded in our empirical observations, which suggest that patients with nasotracheal tubes often require less sedation and fewer vasopressors while maintaining a heightened level of alertness. In the pursuit of optimal patient care, we remain committed to adapting our practices to maximize both safety and comfort.

Thus, the endpoint of this discussion could be to keep the benefits on top of everything else when opting for intubation via either route.

## NASOTRACHEAL VS. OROTRACHEAL INTUBATION - WHICH ONE IS MOST SUITABLE FOR THE PATIENT?

There are several studies that have been carried out to find whether nasotracheal intubation is better than orotracheal, or vice versa. However, what stands out is the fact that different age corpus, gender, and underlying indications have different courses of action that are planned accordingly.

In an open randomized controlled trial carried out on the pediatric population, it was concluded that nasotracheal intubation required a longer duration to complete when contrasted with

orotracheal intubation. This discrepancy in intubation times can be attributed to the greater technical complexity associated with the former procedure. (11)

However, it is essential to recognize that despite this time differential, several critical outcome measures remained comparable between the two intubation methods, particularly in the pediatric patient population.(12)

Among these key outcome measures were instances where children required more than one intubation attempt, complications arising during the intubation process, the need for repeated intubations, incidents of endotracheal tube malposition or displacement, occurrences of unplanned extubation, skin trauma, endotracheal tube (ETT) blockage, the development of ventilator-associated pneumonia (VAP), the duration of intubation itself, the necessity for adrenaline nebulization, post-extubation atelectasis, requirements for post-extubation respiratory support, occurrences of extubation failure, the duration of stay within the pediatric intensive care unit (PICU), and overall mortality rates.(13)(14)

These findings align with prior research in the field, where similar trends were identified in both critically ill adults and pediatric populations. Previous studies have consistently reported that nasotracheal intubation tends to be a time-intensive procedure when compared to orotracheal intubation in various clinical settings.(15)

Furthermore, it is worth noting that nasotracheal intubation, in contrast to orotracheal intubation, has been associated with notable physiological responses, particularly in the early post-intubation period. These responses include alterations in heart rate and blood pressure, underscoring the physiological challenges and potential discomfort associated with nasotracheal intubation. Additionally, nasotracheal intubation has been linked to a higher demand for additional

providers, an increased number of intubation attempts, and a greater incidence of traumatic intubations when compared to the orotracheal approach.(16)

Taken together, our findings and the body of prior research emphasize the multifaceted nature of the intubation process, with nasotracheal intubation, in particular, presenting distinct challenges and considerations that extend beyond the temporal aspect of the procedure. (17)These findings contribute to the broader understanding of airway management strategies in critical care settings.

In another retrospective study, the comparative impacts of nasotracheal versus orotracheal intubation within the cohort of critically ill patients who had undergone mechanical ventilation for a minimum duration of 48 hours.(18)

The finding revealed that patients subjected to nasotracheal intubation exhibited heightened levels of alertness, a phenomenon mirrored by their reduced requirements for sedative agents and vasopressors. This increased alertness also translated into a greater degree of patient mobilization during physiotherapy sessions. There was also an independent link associated with orotracheal intubation and heightened mortality rates. This association remained significant even after meticulous adjustment for disease severity, as measured by Sequential Organ Failure Assessment (SOFA) scores, and the duration of mechanical ventilation.(19)

The depth of sedation administered to critically ill patients has garnered considerable attention in recent literature. Studies have consistently underscored the benefits of maintaining lighter levels of sedation, including decreased mortality rates and reduced mechanical ventilation durations. Guidelines for intensive care have recommended targeting a Richmond Agitation-Sedation Scale (RASS) score of 0 or -1, a recommendation grounded in empirical evidence.(20)

Investigations have also revealed that patients who underwent nasotracheal intubation required lower doses of sedative medications, thereby enabling them to spend more time within the

optimal RASS range. This phenomenon may be attributed to the diminished oropharyngeal stimulation associated with nasotracheal intubation, which, in turn, mitigates the need for pharmacological attenuation of pharyngeal reflexes—a requisite for tolerating an orally placed airway device.(21)

The concept of reduced sedative requirements associated with specific airway interventions aligns with recent research indicating that tracheostomy, as an example, leads to decreased sedative drug dosages and concurrent increases in RASS values. In patients with tracheostomy, the absence of stimuli that typically induce pharyngeal reflexes, such as gagging, contributes to this noteworthy observation.

The associations identified between intubation methods, sedative requirements, and clinical outcomes underscore the importance of tailored approaches to airway management and sedation in this patient population, offering avenues for further exploration and refinement of critical care practices.(22)

Within the scope of this comparative analysis, a distinct pattern emerged: a higher incidence of mortality was observed among patients in the Orotracheal Intubation (OTI) group when compared to their counterparts in the Nasotracheal Intubation (NTI) group. Notably, patients in the OTI cohort presented with elevated Sequential Organ Failure Assessment (SOFA) scores. (23)

It is noteworthy that SOFA scores, initially designed to assess organ dysfunction rather than mortality, have been validated as predictors of mortality across various patient populations.

Contrastingly, scores generated by the Acute Physiology and Chronic Health Evaluation II (APACHE II) and the Simplified Acute Physiology Score II (SAPS II), which are explicitly tailored for mortality prediction, exhibited no significant differences between the two study

groups. The predicted mortality rates derived from SAPS II and the initial SOFA score were found to be 55% and within the range of 40-50%, respectively - indicating results that align closely with the observed mortality rate of 40% within the specified cohort. (24)

The amplified mortality rates observed within the OTI group may be multifactorial in nature. While the association with higher SOFA scores suggests a connection to a greater degree of organ dysfunction, it is imperative to acknowledge that OTI itself could be identified as an independent predictor of mortality, even when considering SOFA scores as a covariate. One plausible explanation for this phenomenon is the elevated requirement for sedation among OTI patients. (25)

The potential deleterious effects of heightened sedation levels have garnered attention within the literature. A growing body of research has illuminated an association between deep sedation and diminished survival rates. This association between sedation depth and adverse outcomes could provide insight into the higher mortality rates observed in the OTI group, given the likely greater sedative requirements associated with this intubation method. (26)

In summary, our investigation uncovered a complex interplay of factors contributing to divergent mortality rates between OTI and NTI groups. While elevated SOFA scores provided a plausible rationale, OTI emerged as an independent predictor of mortality, suggesting that the impact of sedation requirements warrants further exploration. The findings underscore the multifaceted nature of critical care interventions and their influence on patient outcomes, fueling the ongoing pursuit of optimized practices in the field.

Therefore, it could be safe to say that nasotracheal intubation exhibited notable advantages, including reduced reliance on sedative medications, greater support for assisted spontaneous breathing, and enhanced patient mobility during physiotherapy sessions. Interestingly enough,

the incidence rates of clinically apparent sinusitis and ventilator-associated pneumonia (VAP) showed no significant disparity between the nasotracheal and orotracheal intubation groups. However, it is worth highlighting that the orotracheal intubation approach emerged as an independent risk factor for mortality in our study.

## CONCLUSION

Intubation is one of the most important components of airway management in critically ill patients. Not only are these patients in need of better ventilation, but they also require it to stay clear of all secretions that might cause obstruction and then respiratory failure in the patients. Nasotracheal and orotracheal are the two most widely accepted and employed techniques for intubation. However, they have their individual indications and parameters that need to be considered when opting for either one. Throughout different studies, it has been found that nasotracheal intubation indeed has more benefits than the orotracheal method. It also has fewer complications and a more smooth procedure as compared to orotracheal intubation.

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