# Opinion on the Use of Saline During Suctioning

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Endotracheal suctioning is performed to remove secretions from an artificial airway when a mechanically ventilated patient cannot clear them effectively. The procedure may restore airway patency, improve ventilation, reduce resistance, and prevent a mucus plug from obstructing the tube. It can also cause pain, anxiety, coughing, oxygen desaturation, bleeding, changes in heart rate or blood pressure, airway injury, and loss of lung volume. For those reasons, suctioning should be performed only when clinically indicated and with techniques that minimize harm. It should not be carried out automatically according to a fixed schedule when the patient shows no evidence of retained secretions.

My evidence-based opinion is that routine instillation of normal saline into an endotracheal or tracheostomy tube before suctioning should generally be avoided. Current artificial-airway suctioning guidance from the American Association for Respiratory Care states that normal saline should generally be avoided during suctioning. The evidence does not support the traditional assumption that a small volume reliably thins secretions or improves their removal, and instillation may worsen oxygenation, increase discomfort, disperse bacteria, provoke severe coughing, or move material deeper into the airway. An exceptional clinician-directed use in a specific situation is different from making saline a standard step for every suction episode (Blakeman et al., 2022).

## Purpose of Endotracheal Suctioning

An artificial airway bypasses normal upper-airway functions that warm, humidify, and filter inspired gas. Sedation, weakness, pain, neurological illness, and the presence of the tube can reduce an effective cough. Secretions may accumulate inside the endotracheal tube or lower airway and increase resistance. Suctioning uses negative pressure through a catheter to remove accessible material.

The goal is not to make the airway completely dry. Normal mucus contributes to airway defense, and unnecessary suctioning can damage mucosa. The procedure should address evidence of secretion retention rather than the mere presence of an artificial airway. Proper humidification, hydration where clinically appropriate, mobilization, airway-clearance strategies, and treatment of the underlying condition are part of secretion management.

# Indications for Suctioning

Common indications include visible secretions in the artificial airway, coarse or changed breath sounds, a sawtooth pattern on the ventilator flow waveform, increased peak airway pressure, reduced delivered tidal volume, ineffective cough, suspected tube obstruction, and deterioration in oxygenation or ventilation that is reasonably attributed to retained secretions. In children and adults, changes should be interpreted together rather than relying on one nonspecific sign.

Suctioning should not be performed simply because a certain number of hours has passed. Routine scheduled suction exposes patients to repeated discomfort and physiological disturbance without demonstrated need. Clinical assessment before each episode supports individualized care and reduces unnecessary procedures.

# What Saline Instillation Means

Saline instillation refers to placing a small volume of sterile 0.9 percent sodium chloride directly into the artificial airway before or during catheter suctioning. Historically, practitioners believed that saline lubricated the catheter, loosened adherent secretions, stimulated coughing, or diluted thick mucus. Volumes reported in practice have varied by patient age and institution, which itself demonstrates the absence of one well-supported standard.

Direct instillation should not be confused with appropriate systemic hydration, humidification of inspired gas, nebulized therapy prescribed for a specific indication, or using sterile saline to rinse equipment outside the airway. Those interventions have different mechanisms and evidence. Pouring saline through an endotracheal tube does not distribute evenly throughout tenacious secretions and does not reliably reproduce physiological humidification.

# Why Routine Saline Was Historically Common

Clinical practices often persist because they are taught by experienced staff, included in old policies, and seem to produce an immediate visible result. Saline may provoke a vigorous cough and yield more material in the suction tubing. That observation can create the impression that secretion clearance improved. However, a larger aspirate may include the saline itself and secretions displaced from a different location, and the physiological cost may outweigh the visible result.

Older surveys found frequent saline use in adult and pediatric intensive-care units, particularly when secretions appeared thick. Variation among nurses and respiratory therapists reflected local custom more than standardized evidence. The presence of a widespread practice does not establish benefit. Evidence-based care requires comparing outcomes, complications, and alternatives rather than relying on familiarity.

# Evidence Against Routine Instillation

Studies and reviews have not shown consistent improvement in oxygenation, secretion removal, pulmonary mechanics, or other clinically important outcomes from routine saline instillation. Some studies report transient reductions in oxygen saturation or adverse physiological responses. The AARC's 2022 clinical practice guideline therefore recommends that saline generally be avoided during artificial-airway suctioning (Blakeman et al., 2022; Morrow & Argent, 2015).

The word "generally" matters. Guidelines summarize evidence for typical practice and cannot describe every unusual bedside situation. They do not support a standing order that saline be used for every patient, every shift, or every episode of thick secretions. Any departure should have a clear rationale, close monitoring, and documentation of the response.

# Potential Effect on Oxygenation

Suctioning itself can remove gas from the airway and interrupt ventilation, causing oxygen desaturation, especially in patients with limited reserve. Saline can intensify coughing and temporarily interfere with gas exchange. If fluid reaches smaller airways, it may alter ventilation distribution until it is cleared. Neonates and small children have less oxygen reserve and smaller airway diameter, making brief physiological disturbances potentially more significant.

Appropriate preoxygenation is recommended for adults and children when clinically indicated before suctioning. The oxygen strategy should be individualized because excessive oxygen also has risks, particularly in neonates. Monitoring should continue during and after the procedure, and suction should be stopped if the patient develops significant instability.

# Pain, Anxiety, and the Patient Experience

Patients who are conscious often describe endotracheal suctioning as frightening, painful, suffocating, or exhausting. The original essay includes an account of saline creating a sensation similar to drowning. Individual reports cannot determine the average effect, but they are ethically important because they describe an experience clinicians may underestimate when focused on technical completion.

Communication should occur before the procedure whenever the situation permits. The clinician can explain why suction is needed, what sensations may occur, how long it will last, and how the patient can signal distress. Analgesia and sedation should be assessed as part of the overall care plan, but medication should not be increased automatically without evaluating risks. Calm technique, preparation, and limiting the number and duration of passes can reduce suffering.

# Does Saline Thin Secretions?

Thick secretions reflect water content, proteins, cells, infection, inflammation, blood, environmental conditions, medication effects, and inadequate humidification. A small bolus of saline introduced into the tube may not mix thoroughly with mucus. It can follow the path of least resistance, remain in the tube, be suctioned back immediately, or move material distally. The intuitive idea of “watering down” mucus is therefore not physiologically reliable.

More effective management begins with checking the humidification system, ventilator circuit, heat-and-moisture exchanger, systemic fluid status, medications, airway-clearance needs, and cause of abnormal secretions. A blocked tube may require urgent intervention or replacement rather than repeated saline and suction attempts.

# Risk of Bacterial Dispersal

Artificial airways develop biofilm and can contain colonizing microorganisms. Instilled saline and forceful coughing may dislodge material from the tube or upper airway and move it toward lower airways. Research has raised concern about bacterial dispersal, although the relationship with ventilator-associated pneumonia is complex and influenced by many factors.

This risk supports avoiding unnecessary instillation. Infection prevention also requires hand hygiene, appropriate personal protective equipment, oral care, circuit management, cuff-pressure practices, and sterile or clean technique according to the suction method and institutional standard. Saline avoidance alone cannot prevent pneumonia.

# Airway Trauma and Bleeding

Catheter contact and excessive negative pressure can injure the tracheal mucosa. Repeated deep suctioning may increase bleeding, inflammation, edema, and granulation. Saline-induced coughing may add mechanical stress, particularly when the airway is already irritated.

The catheter should be appropriately sized so that it does not occlude an excessive portion of the artificial airway. The AARC guideline supports using a catheter that occupies less than 70 percent of the endotracheal-tube lumen in infants and children and less than 50 percent in adults. Negative pressure and catheter advancement should follow age-appropriate policy and device guidance (Blakeman et al., 2022).

# Shallow Versus Deep Suctioning

Shallow suctioning advances the catheter to a predetermined depth near the end of the artificial airway. Deep suctioning advances until resistance is met and then withdraws slightly before applying suction. Deep suction is more likely to contact mucosa and should not be the routine first approach.

Current guidance favors shallow suctioning and reserves deep suction for situations in which shallow suction does not achieve adequate clearance. The required depth should be known from tube length and documentation rather than estimated blindly. Force should never be used against resistance because the catheter can cause injury or enter an inappropriate pathway.

# Duration of Each Suction Event

Each suction event should be as brief as possible. AARC guidance recommends limiting application of suction to no more than approximately fifteen seconds. Longer duration increases the risk of oxygen loss, airway collapse, arrhythmia, and distress. The clinician should allow recovery between passes and reassess whether another pass is genuinely required (Blakeman et al., 2022).

Repeated catheter insertion should not continue merely to obtain a visually clean tube. Patient stability and clinical improvement are more important than the amount seen in the collection system. If several passes fail, the team should reconsider the cause and whether another intervention is necessary.

# Open and Closed Suction Systems

Open suction requires disconnecting the patient from the ventilator and inserting a sterile single-use catheter. Closed suction uses an in-line catheter within a protective sleeve, allowing suction without complete circuit disconnection. Closed systems can be useful for patients requiring high positive end-expiratory pressure, frequent suction, or reduced circuit interruption, although neither system is universally superior for every outcome.

Open suction should use sterile technique. Closed catheters must also be handled according to manufacturer and infection-control guidance. A closed system does not justify automatic frequent suction and does not eliminate physiological disturbance. The decision should reflect the patient’s respiratory support, secretion burden, infection-control considerations, and institutional policy.

# Neonatal Considerations

Neonates have small airways, limited functional residual capacity, and vulnerability to rapid

desaturation, bradycardia, airway trauma, and changes in cerebral and pulmonary physiology. A small amount of saline relative to body size may produce a larger disturbance than in an adult. Routine instillation in neonates is therefore particularly difficult to justify without clear evidence of benefit.

Assessment should include visible secretions, breath sounds, ventilator waveforms, tube patency, oxygen requirement, and the infant's response. Catheter size, negative pressure, depth, and duration must be carefully controlled. Preoxygenation should not be indiscriminate because excessive oxygen exposure can be harmful; the neonatal team should use an individualized target and protocol.

# Pediatric Considerations

Children differ greatly by age and tube size. Fear and inability to understand the procedure can increase movement and distress. Developmentally appropriate explanation, caregiver support where feasible, and secure airway management are important. Catheter occlusion of the small tube must be minimized.

A child with a mucus plug may deteriorate quickly, so avoidance of routine saline does not mean delaying urgent airway clearance. It means selecting the intervention most likely to restore patency safely. If an obstruction cannot be relieved, the team may need bronchoscopy, tube exchange, chest physiotherapy, or another targeted approach.

# Adult Considerations

Adults may communicate discomfort and preferences, but critically ill patients can be sedated, delirious, weak, or unable to speak. Clinicians should observe facial expression, movement, ventilator synchrony, heart rate, and other signs of distress. A prior negative experience should be incorporated into the plan.

Comorbid cardiac disease, pulmonary hypertension, intracranial pathology, severe hypoxemia, and hemodynamic instability can increase procedure risk. Suctioning should be coordinated with the wider clinical picture rather than performed as an isolated routine task.

# Consent and Clinical Necessity

The original essay suggests leaving the procedure entirely to the patient's discretion after describing risks. A capable patient has the right to receive information and refuse nonemergency treatment. However, bedside consent for routine necessary care is often part of an ongoing treatment relationship rather than a formal signed process before every suction event. Clinicians should seek cooperation and honor refusal while assessing capacity, urgency, and alternatives.

If airway obstruction threatens life and the patient lacks capacity, emergency treatment may be necessary under applicable law and ethical standards. Respect for autonomy does not require allowing preventable suffocation when valid consent cannot be obtained. The least harmful effective intervention should be used, and the reason should be documented.

## Alternatives to Routine Saline

Effective heated humidification or a properly functioning heat-and-moisture exchanger supports secretion management. The device should be assessed when secretions become unusually thick. Adequate systemic hydration may help when dehydration is present, but fluid administration must be based on the patient's cardiac, renal, and overall condition.

Mobilization, repositioning, physiotherapy, cough assistance, bronchodilator therapy, mucolytic treatment, or nebulized saline may be considered for selected diagnoses under appropriate orders. These interventions are not interchangeable and have their own evidence and risks. The core principle is to treat the reason secretions are difficult to clear rather than repeatedly adding saline directly to the tube.

## When an Exceptional Use Might Be Considered

Some clinicians may consider a very small, carefully controlled saline amount when a tenacious plug is visibly lodged within the artificial airway and standard measures have failed, particularly if immediate tube replacement or bronchoscopy is not yet available. The evidence for such use is limited, and it should not be converted into a routine protocol. The team should weigh the risk of the unresolved obstruction against the risks of instillation.

Any exceptional use should specify indication, volume, monitoring, and response. If it does not produce prompt benefit, repetition without reassessment is inappropriate. A recurring need signals that humidification, tube condition, infection, hydration, or another underlying factor requires investigation.

## Safe Suctioning Sequence

A safe sequence begins with assessment and preparation. The clinician verifies the indication, explains the procedure where possible, evaluates oxygenation and hemodynamic status, selects the correct catheter, and uses appropriate personal protective equipment. Preoxygenation is provided when indicated. The catheter is advanced to the planned depth without suction, suction is applied during withdrawal for the shortest necessary time, and the patient is allowed to recover.

Afterward, the clinician reassesses breath sounds, ventilator waveforms, airway pressure, oxygen

saturation, secretion characteristics, and patient comfort. The record should include the indication, response, complications, and any unusual intervention. Documentation supports continuity and prevents unnecessary repeated suction.

# Quality Improvement

Institutions should review policies that still include routine saline. Education should explain why familiar practice changed and should offer alternatives for thick secretions. Simply deleting saline from a supply cart without addressing humidification, assessment, and clinician concerns can lead to inconsistent workarounds.

Audits can examine whether suctioning is indication-based, whether catheter size and duration follow standards, whether saline is used, and whether adverse events occur. Patient-reported discomfort should be part of quality evaluation. Nurses, respiratory therapists, physicians, and infection-prevention teams should develop one coherent policy.

# My Clinical Opinion

Routine saline instillation before endotracheal suctioning should not be incorporated as standard care for neonates, children, or adults. The proposed benefits are inconsistent, while the procedure can add discomfort and physiological risk to an already invasive intervention. Thick secretions should prompt assessment of humidification, hydration, tube patency, infection, medications, and airway-clearance strategy.

This position does not imply that suctioning itself should be avoided when clearly indicated. Retained secretions and tube obstruction can be life-threatening. The evidence-based response is targeted suction performed correctly, with saline generally omitted and exceptional decisions made according to the immediate clinical problem.

# Conclusion

Endotracheal suctioning is an important intervention for patients who have evidence of retained secretions or artificial-airway obstruction. It should be performed as needed, not according to an automatic timetable. Clinicians should use an appropriately sized catheter, favor shallow suction before deep suction, limit each suction event to approximately fifteen seconds, monitor the patient, and use preoxygenation when indicated.

Normal saline instillation was historically used to loosen secretions and stimulate cough, but evidence has not demonstrated consistent clinical benefit. It may cause desaturation, distress, coughing, bacterial dispersal, and movement of material deeper into the airway. These concerns are especially

important in neonates and children with small airways and limited physiological reserve.

My opinion is therefore that routine saline during suctioning should generally be avoided, consistent with current AARC guidance. Rare case-specific use should not be confused with routine practice and should occur only after the team identifies a clear indication, considers safer alternatives, and monitors the response. Evidence-based suctioning protects airway patency while respecting the patient's comfort, dignity, and physiological safety (Blakeman et al., 2022).

# References

Blakeman, T. C., Scott, J. B., Yoder, M. A., Capellari, E., & Strickland, S. L. (2022). AARC clinical practice guidelines: Artificial airway suctioning. *Respiratory Care, 67*(2), 258–271.

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