Opinion on the Use of Saline During Suctioning

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Endotracheal suctioning is used when a patient with an artificial airway cannot clear secretions effectively and airway patency or ventilation is being compromised. The procedure can be necessary, but it is not physiologically neutral. Suctioning may provoke coughing, oxygen desaturation, changes in heart rate or blood pressure, mucosal trauma, pain, anxiety, and transient loss of lung volume. For many years, some clinicians instilled sterile normal saline into the endotracheal or tracheostomy tube before suctioning in the belief that saline would loosen thick secretions, improve their removal, or stimulate a stronger cough. Current evidence does not support routine use of that practice.

The American Association for Respiratory Care's 2022 clinical practice guideline recommends that normal saline solution generally be avoided during artificial-airway suctioning. A 2023 systematic review and meta-analysis reached the same overall conclusion, finding more evidence of harm than benefit, including adverse changes in oxygenation and other physiologic variables (Blakeman et al., 2022; Chang et al., 2023). My position is therefore that routine saline instillation before suctioning should not be standard nursing or respiratory-care practice. If it is considered at all, it should be an exceptional, patient-specific intervention supported by local policy and clinical judgment rather than an automatic step in the suctioning procedure.

Why Saline Instillation Became Common—and Why the Rationale Is Weak

The theoretical argument for saline is easy to understand. Thick secretions can obstruct an artificial airway, and adding fluid appears as though it should dilute mucus and make it easier to remove. Clinicians may also observe that instillation triggers vigorous coughing and that more visible secretions are retrieved afterward. These observations helped establish a practice tradition even when the underlying physiology was uncertain.

However, a small bolus of saline placed into an artificial airway does not necessarily mix evenly with lower-airway secretions. Some fluid may remain in the tube, some may move unpredictably into the bronchial tree, and some may be rapidly suctioned back. Increased secretion volume in the suction container does not prove that airway clearance has improved because the measured material may partly reflect the saline that was just instilled. The desired outcome is improved airway patency and

gas exchange, not simply a larger volume in the collection chamber.

Cough stimulation is similarly ambiguous. A stronger cough may help mobilize material, but it can also increase discomfort, oxygen consumption, airway pressure, or cardiovascular stress. The question is therefore not whether saline changes what happens during suctioning. It clearly can. The question is whether those changes improve clinically meaningful outcomes enough to justify the accompanying physiologic burden.

The Best Available Evidence Does Not Support Routine Use

The 2022 AARC guideline reviewed evidence across neonatal, pediatric, and adult artificial-airway suctioning. Its recommendations included suctioning based on clinical indicators rather than simply by schedule, preoxygenation for pediatric and adult patients, limiting suction duration, using appropriate catheter size and suction pressure, and avoiding routine saline solution. The guideline specifically notes that several studies found unfavorable effects on measures of oxygenation and that the evidence since the previous 2010 guideline did not justify changing the recommendation against routine saline instillation (Blakeman et al., 2022).

Chang et al. (2023) conducted a systematic review and meta-analysis of 16 studies involving mechanically ventilated adults. Across the narrative synthesis, saline instillation before suctioning was associated with outcomes including decreased oxygen saturation, longer recovery to baseline saturation, decreased arterial pH, increased heart rate, and increased systolic blood pressure. Some studies reported increased secretion removal, and one line of evidence suggested lower ventilator-associated pneumonia, but the overall review concluded that the harms outweighed the demonstrated benefits and supported avoiding routine instillation.

A later review by Glancy and Wedgeworth (2025) reached a similar conclusion for adults with altered airways. After appraising the available evidence, the authors found that normal saline instillation was associated with adverse effects and did not have sufficient evidence to justify routine use for secretion management. The persistence of this conclusion across successive reviews is important because the practice has remained common in some settings despite long-standing questions about its effectiveness.

The evidence is not perfect. Many studies are relatively small, methods differ, and outcomes such as oxygen saturation, secretion volume, pneumonia, discomfort, and hemodynamics do not always move in the same direction. The AARC guideline itself acknowledges limitations in the quality of available evidence. This uncertainty is not a reason to continue routine instillation. When an intervention lacks a clearly demonstrated benefit and has plausible and documented adverse effects, routine use requires stronger justification than selective nonuse.

Potential Harms Are Clinically Relevant

Oxygenation is the most consistently discussed concern. Suctioning itself can reduce oxygenation by removing gas from the airway, interrupting ventilation, stimulating coughing, and altering lung volume. Introducing saline can add another disturbance. Several studies summarized by the AARC and later reviews found transient decreases in oxygen-related measures or slower return to baseline when saline was used. In a patient with limited cardiopulmonary reserve, even a short deterioration may matter.

Saline may also increase coughing, dyspnea, bronchospasm, tachycardia, and patient distress. Older patients or people with severe lung disease may tolerate these changes poorly. The AARC guideline also raises concern that instillation may dislodge bacterial biofilm from the inner surface of the artificial airway and move material deeper into the respiratory tract. Although the relationship between saline use and ventilator-associated pneumonia remains inconsistent across studies, the possibility weakens the assumption that “washing” the airway is automatically hygienic.

Intracranial pressure is another consideration in neurologically vulnerable patients. Coughing, hypoxemia, and physiologic stimulation can increase intracranial pressure, meaning unnecessary airway manipulation may be especially undesirable in patients with certain brain injuries or neurosurgical conditions. Clinical decisions in such cases should follow the patient’s monitoring data and institutional protocol rather than habitual technique.

Patient comfort should also be treated as an outcome. Artificial-airway suctioning can already be distressing. Adding fluid that produces choking, coughing, or breathlessness without a demonstrated benefit conflicts with the principle of minimizing avoidable procedural burden. A 2023 commentary accompanying the newer evidence emphasized the continuing gap between research findings and persistent bedside use, suggesting that tradition can outlast the evidence supporting it (Schmollgruber et al., 2023).

What Should Be Done Instead?

The better approach is to assess whether suctioning is actually indicated and then perform the procedure in a way that minimizes harm. The AARC identifies findings such as visible secretions, abnormal breath sounds, a sawtooth ventilator waveform, and increased airway resistance as possible indicators depending on the population. Suctioning should address a clinical need rather than occur automatically simply because a fixed number of hours has passed.

Preoxygenation is recommended before suctioning in pediatric and adult patients, especially when desaturation is a concern. Catheter size matters because an excessively large catheter can occlude too much of the artificial airway and increase negative pressure. The 2022 guideline recommends that the catheter occupy less than half of the endotracheal-tube lumen in pediatric and adult patients

and less than 70 percent in neonates. Suction application should also be limited in duration, with a maximum of approximately 15 seconds per suctioning event recommended by the guideline.

Shallow suctioning is preferred when it is effective because deeper insertion can create additional trauma and stimulation. Deep suctioning should be reserved for situations in which shallow suctioning does not remove the obstruction. Open suctioning should use sterile technique, while both open and closed systems can be appropriate for adults depending on clinical circumstances.

Thick secretions should prompt investigation of their cause rather than reflexive saline instillation. Hydration status, humidification, airway temperature, underlying infection, medication effects, secretion production, and adequacy of the humidification system may all matter. The goal should be to prevent secretions from becoming excessively tenacious when possible and to correct reversible contributors.

There may be exceptional situations in which a clinician considers a small amount of saline for a specific obstructive secretion problem, particularly when ordinary methods have failed. The evidence base for such selective use is limited, and the AARC states that saline, if used at all, should be used sparingly with awareness of potential adverse effects. This distinction is important: rejecting routine instillation does not mean declaring that no clinician could ever justify it under any circumstance. It means that the burden of justification should rest on the unusual case rather than on tradition.

Clinical Position

My opinion is that normal saline should not be instilled routinely before endotracheal or tracheostomy suctioning. The most authoritative current respiratory-care guideline advises against routine use, and newer systematic evidence has not produced a compelling reason to reverse that recommendation. The theoretical advantages—loosening mucus and increasing visible secretion return—have not translated consistently into better outcomes, while adverse effects involving oxygenation, coughing, dyspnea, and hemodynamic stress remain plausible and documented.

Evidence-based suctioning should instead focus on clinical indication, preoxygenation, appropriate catheter size and suction pressure, short procedure duration, shallow technique when possible, sterile practice for open suctioning, and management of factors that contribute to thick secretions. If saline is considered for an unusual patient-specific problem, the decision should be deliberate, limited, monitored, and consistent with local policy. Habit alone is not an adequate reason to add an intervention to an already stressful procedure.

References

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