Normal Saline Instillation during Suctioning

CLINICAL PRACTICE

Normal saline (NS) has been widely utilized during endotracheal and tracheal suctioning. Clinicians have used NS believing it breaks up pulmonary secretions and helps with their removal during suctioning, especially in the presence of thick secretions.

REVIEW OF EVIDENCE

In the last 10-15 years, numerous studies have been conducted on the physiological effects of NS instillation. Specifically, these studies have measured the impact of NS instillation on oxygenation, sputum recovery, infection rates, hemodynamics and perceived dyspnea, as shown below:

Variable	Results
Oxygenation [1-6,9,10,12] (ABG's, O2 sats, & mixed venous saturations)	1. Decreased oxygenation levels - Desaturation may persist up to 10-15" post-suctioning
Sputum recovery [1,5-6,12] (in volume & weight)	1. No significant increase in sputum retrieved with suctioning 2. In studies where NS was radioactively labeled, it was found to sit near the bottom of the ET tube (rather than mixing with secretions) and then was rapidly absorbed providing evidence that NS and secretions do not mix [8]
Perceived dyspnea [11]	1. Increased level of perceived dyspnea in older patients (> 60) - May persist up to 10 min after suctioning
Hemodynamics [3-4,6] (HR, BP, RR)	1. NS use may increase HR (no effect on BP or RR) 2. Increase in coughing with NS use may have other detrimental effects, such as increased MAP & ICP
Infection rates [7] (Bacterial colonies)	1. NS dislodges bacterial colonies (up to 5 X as many bacterial colonies may be washed out!) - NS may contribute to lower airway contamination

These studies provide Class I evidence of the adverse physiological effects of NS and therefore, support against the routine use of NS with endotracheal/tracheal suctioning.

EBP RECOMMENDATION

A. NS instillation has several potential adverse effects and should NOT be routinely used.
Indications for use of NS with suctioning:
   1. To elicit a cough (only if unable to elicit any other way)
      - This applies ONLY to patients with intact cough reflex
   2. To pass the suction catheter in a suspected obstruction of an ET/trach tube with thick encrusted secretions
   3. To clear suction catheter after each pass & when finished suctioning
      - If catheter not cleared, pathogens may be introduced back into airway increasing the risk of infection

B. NS and mucus are immiscible and do not mix. Therefore, NS does NOT thin or mobilize secretions and thereby, increase the yield of secretions. Rather, the best known ways to manage thick tenacious secretions and prevent mucus plugs include:
   1. Humidification

- Adequate systemic hydration
- Passive or active humidification for ventilated patients

2. Mucolytic agents

C. Good handwashing is essential to reduce infection when opening NS vials
Studies have found increased contamination with various pathogens when clinicians used the non-gloved thumb to twist off the top of NS vial [13]

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LEVELS OF EVIDENCE

Class of EBP Recommendation	Criteria	Clinical Definition
Class I Definitely recommended	Supported by **excellent** evidence, with **at least 1 prospective randomized, controlled trial.**	**Class I** interventions are always acceptable, safe & effective. Considered definitive standard of care
Class IIa Acceptable & useful	Supported by **good to very good** evidence. Weight of evidence and expert opinion strongly in favor.	**Class IIa** interventions are acceptable, safe & useful. Considered intervention of choice by majority of experts.
Class IIb Acceptable & useful	Supported by **fair to good** evidence. Weight of evidence and expert opinion not strongly in favor.	**Class IIb** interventions are also acceptable, safe and useful. Considered optional or alternative interventions by majority of experts.
Indeterminate Promising, evidence lacking, immature	Preliminary research stage. Evidence: **No harm but no benefi**t. Evidence insufficient to support a final class decision.	**Indeterminate**: Describes treatments of promise but limited evidence.
Class III May be harmful; no benefit documented	Not acceptable, not useful, **may be harmful**.	**Class III** refers to interventions with no evidence of any benefit; often some evidence of harm