Efficacy and safety of normal saline instillation: a systematic review
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CRD summary
This review evaluated the effects and safety of normal saline instillation prior to airway suction in intubated patients. The authors concluded that there was little evidence of benefit and minimal evidence of safety risks. Despite some potential limitations that arose from the search, the authors' conclusions reflected the limited evidence presented and appear to be reliable.

Authors' objectives
To evaluate the effects and safety of normal saline instillation prior to airway suction in intubated patients.

Searching
MEDLINE, CINAHL, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL) and full text clinicians' health journals were searched for French- and English-language articles from the earliest date to March 2009. Search terms were reported. Citation tracking and key author searches were conducted.

Study selection
Randomised controlled trials (RCTs), crossover studies and within-patient studies of adult and paediatric participants who received bolus of normal saline (0.9%) during open or closed airway suction were eligible for inclusion in the review. Eligible studies had to report at least one outcome (listed in the paper) related to respiratory, haemodynamic or intracranial parameters, respiratory mechanics, pneumonia or other outcomes (bronchospasm, atelectasis, secretion yield, colonisation of secretions and ventilator-associated).

Included studies focused mainly on adults (mean age 61.7 years, range 20 to 87); paediatric patients and neonates were represented in some studies. Most patients were ventilated and in intensive care. Normal saline instillation (various doses) was compared with no saline. Most of the included studies used open suction. More than half of the studies involved pre-oxygenation prior to suction. Publication dates ranged from 1987 to 2009.

Two reviewers independently selected studies for inclusion.

Assessment of study quality
Study quality was assessed using PEDro scale. Scores were allocated for random allocation, allocation concealment, baseline comparability, blinding, follow-up, use of intention-to-treat analysis and reporting of point measures and variability. A maximum score of 10 was possible for each study.

Two independent reviewers assessed the quality of included studies. Differences were resolved by consensus. Authors were contacted for clarification where necessary.

Data extraction
Data were extracted to enable calculation of effect sizes and 95% confidence intervals (CI). Where there were inequalities in baseline data, effect size was calculated as the difference of the mean change between treatment and control groups divided by the pooled standard deviation.

Two reviewers extracted data.

Methods of synthesis
Where possible, effect sizes and 95% CIs were pooled in a meta-analysis. The authors appeared to interpret the magnitude of effect according to conventional criteria of small (0.2), medium (0.5) and large (0.8). Alternatively, a narrative synthesis was provided. Study variation was presented in tabular form.
Results of the review
Fifteen studies (n=696) were included in the review: five RCTs (n=465); eight crossover designs (n=181); one benchtop study (n=10); and one observational study (n=40). PEDro scores ranged from two to eight (median 4.7).

In the only meta-analysis (two trials, 65 patients), an increase in sputum yield resulted from normal saline instillation (effect size 0.50, 95% CI 0.10 to 0.90) compared to no saline.

There were mixed results in other studies that measured outcomes related to haemodynamics, oxygenation, tube patency and ventilator-associated pneumonia.

Authors’ conclusions
There was little evidence of benefit and minimal evidence of safety risks associated with normal saline instillation prior to airway suction in intubated patients.

CRD commentary
The review addressed a clear question supported by detailed and potentially reproducible inclusion criteria. The search strategy included several relevant data sources. The language restrictions, together with no apparent attempt to locate unpublished material, meant that studies may have been missed and language and publication biases could not be ruled out. The review process was conducted with sufficient attempts to minimise error and bias. Quality assessment results were taken into account in the discussion of findings. Clinical variation within the included studies meant that the chosen methods of synthesis were appropriate.

Despite some potential limitations that arose from the search, the authors’ conclusions reflected the limited evidence presented and appear reliable.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that higher-quality controlled trials with clinically relevant outcomes, such as ventilator-associated pneumonia and tube patency, were needed. Regression analysis that explored the quantity and tenacity of secretions were worthy of investigation.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.