

Setting a Regulated Suction Pressure for Endotracheal Suctioning: a Systematic Review

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Thesis submitted October 2011

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Abstract

The Thesis has set out to synthesise a recommendation with regard to the setting of a safe yet effective vacuum/suction level, for the performance of endotracheal suctioning of intubated and mechanically ventilated patients in the acute care environment, from a systematic review of human studies.

Specifically the systematic review has sought to answer the following questions:

- What is the best evidence for regulating vacuum pressure in the performance of endotracheal suctioning?
- What is the best evidence for regulating vacuum pressure for endotracheal suction as opposed to setting no regulated pressure in the performance of endotracheal suctioning?
- What is the best evidence for a limit to which vacuum should be regulated for endotracheal suction?
- To what extent does the developed airflow impact on the safety and effectiveness of the suction apparatus?

We have first examined the delivery of suction to the patient by examining hospital suction systems and the physics of suction/vacuum before a review of the relevant anatomy of the human airway and how these may affect one, the other.

While the Systematic Review has focused on extracting data from studies of the effect of setting a regulated suction/vacuum pressure in human subjects, it was found that, in order to provide the best available evidence, the discussion necessarily incorporated the findings of animal and bench test experiments as these underpin the research in this area. It is impossible to neglect the effects of physics and the mathematical certainty of negative pressures developing in the chest at various levels of increasingly negative suction pressure.

The systematic review included 30 primary research quantitative papers with regard to human subjects in which a level of suction was described as well as variables such as loss of lung volume, trauma or haemodynamic changes. These were examined with regard to extracting outcomes of significance.

It has been due only to the heterogeneous nature these human studies that they have, on the whole, been found unsuitable for pooling into a meta-analysis. However, there remains, within the published literature, a remarkable degree of consistency. It is for this reason that results have been presented as a narrative summary.

Conclusion

Despite the heterogeneous nature and small scale of much of the research into this subject, findings support and give weight to those recommendations laid out in previous meta-analysis and reviews of the endotracheal suctioning process. An optimal level of vacuum is that which is the lowest that will achieve clearance of retained secretions whilst minimising disruption to ventilation: “As little as possible/as much as necessary.” Negative pressures of 80–100mmHg in neonates and less than 150mmHg in adults have been recommended. This review has found flows of 15 to 20 litres of air entrained through a suction catheter described as sufficient to perform the procedure. While no safe maximum has been determined; there is no evidence to support suctioning an artificial airway from an unregulated wall suction outlet.

Student declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

Signed.

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David Arbon.

*Ex diuturnitate temporis omnia praesumuntur
esse solemniter acta.*