The Hierarchy of Evidence

The Hierarchy of evidence is based on summaries from the National Health and Medical Research Council (2009), the Oxford Centre for Evidence-based Medicine Levels of Evidence (2011) and Melynyk and Fineout-Overholt (2011).

I Evidence obtained from a systematic review of all relevant randomised control trials.

II Evidence obtained from at least one well designed randomised control trial.

III Evidence obtained from well-designed controlled trials without randomisation.

IV Evidence obtained from well designed cohort studies, case control studies, interrupted time series with a control group, historically controlled studies, interrupted time series without a control group or with case- series

V Evidence obtained from systematic reviews of descriptive and qualitative studies

VI Evidence obtained from single descriptive and qualitative studies

VII Expert opinion from clinicians, authorities and/or reports of expert committees or based on physiology

Melynyk, B. & Fineout-Overholt, E. (2011). *Evidence-based practice in nursing & healthcare: A guide to best practice (2nd ed.).* Philadelphia: Wolters Kluwer, Lippincott Williams & Wilkins.

National Health and Medical Research Council (2009). *NHMRC levels of evidence and grades for recommendations for developers of guidelines* (2009). Australian Government: NHMRC. http://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/evidence_statement_form.pdf

OCEBM Levels of Evidence Working Group Oxford (2011).*The Oxford 2011 Levels of Evidence*. Oxford Centre for Evidence-Based Medicine. http://www.cebm.net/index.aspx?o=1025

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Reference *(include title, author, journal title, year of publication, volume and issue, pages)*	Evidence level (I-VII)	Key findings, outcomes or recommendations
McCormack, K. (2003). Endotracheal suctioning: A review and study into practice. *Journal of Neonatal Nursing*. 9(2):48-54.	**V**	• **Study to review suction practices of 226 nurses from 22 neonatal units** • **Factors covered: frequency of suctioning, number of practitioners and gloves, size and type of catheters, depth of suction duration of sucking, hypoxaemia during suction, suction pressure, saline installation** • **Above factors related to available research regarding best practice for each factor**
Pritchard, M.A., Flenady, V., & Woodgate, P. (2003). Systematic review of the role of pre-oxygenation for tracheal suctioning in ventilated newborn infants. *Journal of Paediatrics and Child Health*. 39(3): 163-165.	**IV**	• **Review of evidence related to short term pre-oxygenation benefits versus long term morbidity** • **The decision whether to pre-oxygenate for tracheal suction in preterm ventilated neonates cannot be answered by this review**
St John, R.E. (2004). Protocols for Practice. Airway management. *Critical Care Nurse*. 24(2): 93.	**VII**	• **Discussion of clinical indications for ETT suction, amount of suction pressure required, suction catheter size, necessity for normal saline instillation**
Tingay, D.G., Copnell, B., Grant, C. A., Dargaville, P.A., Dunster, K.R. & Schibler, A (2010). The effect of endotracheal suction on regional tidal ventilation and end-expiratory lung volume. *Intensive Care Medicine.* 36: 888-896.	**III**	• **Examines impact of different ETT suction techniques on regional and end-expiratory lung volume and tidal volume in an animal model of surfactant-deficient lung injury** • **Suction catheter size exerted a greater influence than suction method alone on lung volume loss** • **Recovery of regional lung volume and tidal ventilation after suction was rapid and uniform in this animal model, regardless of the suction method and catheter size**

Copnell. B., Dargaville, P.A., Ryan, E.M., Kiraly, N.J., Chin, L.O.F., Mills, J.F., & Tingay, D.G. (2009). The Effect of Suction Method, Catheter Size, and Suction Pressure on Lung Volume Changes During Endotracheal Suction in Piglets. *Pediatric Research*: 66 (4): 405-410.	**III**	• **Suction pressure and catheter size effects on lung volume during open and closed endotracheal suction** • **Individual and combined effects of suction variables on lung volume were examined** • **Three suction methods used: open, closed in-line and closed with side-port adapter** • **Closed suction has no advantage in the prevention of volume loss in this animal model**
Hough, J., Trojman, A., Schibler, A. (2016) Effect of Time and Body Position on Ventilation in Premature Infants/ Pediatric Research: 80 (4): 499-504	**II**	• **Changes to patient body position may help with lung recruitment when ventilated**
Goncalves, R.L, (2015) Endotracheal Suctioning in Intubated Newborns: an Integrative Literature Review. Rev Bras Ter Intensiva. 27 (3): 284-292	**V**	• **ETT suction should only be performed if a patient has signs of tracheal secretions, rather than on a time frame basis.** • **Suction pressure should remain below 100mmhg** • **Hyperoxygenation should not be used on a routine basis (but if indicated only an increase of 10-20% from baseline requirement and maintained for at least 1 min after suctioning)** • **Use of saline lavage should not routinely be used** • **Suction timing should be limited to 15 secs** •
Tume, L., Baines, P., Guerrero, R., Hurley, M., Johnson, R., Kalantre, A., Ramaraj, R., Ritson, P., Walsh, L., & Arnold, P. (2017). Pilot Study Comparing Closed Versus Open Tracheal Suctioning in Postoperative Neonates and Infants With Complex Congenital Heart Disease. *Pediatric Critical Care Medicine, 18*(7), 647-654.	**II**	• **Closed system suctioning has also been shown to reduce the adverse physiological effects related to suction including hypoxia, bradycardia, desaturation and hypotension.**

Tahei, P., Asgari, N., Mohammadizadeh, M., & Golchin, M. (2012). The effect of open and closed endotracheal tube suctioning system on respiratory parameters of infants undergoing mechanical ventilation. *Iraninan Journal of Nursing and Midwifery Reasearch, 17*(1), 26-29		• **Closed system suctioning was shown to be preferable to open suctioning as it results in improved stabilisation of oxygenation during and post suctioning**
Hess, R., Kallstrom, J., Mottram, C., Myers, T., Sorenson, H., Vines, D. (2003).Care of the ventilator circuit and its relation to ventilator-associated pneumonia. *American Association for Respiratory Care*, *48*(9). 869-79	**II**	• **Closed suctioning also reduces the risk for contamination with environmental pathogens, reduces viral and bacterial colonisation within the ventilation circuit and it also safely protects nursing and medical staff from exposure to patient bodily fluids.** • **Closed suction catheters do not need to be changed on a daily basis for the purpose of infection control**
Evans, J., Syddall, S., Butt, W., & Kinney, S. (2014). Comparison of open and closed suction on safety, efficacy and nursing time in a paediatric intensive care unit. *Australian Critical Care, 27.* 70-74.		• **Closed suction caused fewer disturbances to a patients haemodynamic state, took less time and could be safely performed by one registered nurse.**
Bruschettini, M., Zappettini, S., Moja, L & Calevo, M. G,. (March 2016) Frequency of endotracheal suctioning for the prevention of respiratory morbidity in Ventilated newborns. Cochrane Database of Systematic Reviews,	**I**	• **No statistical difference between 6hrly and 12hrly regular suctioning intervals.** • **Not sufficient evidence to suggest the ideal frequency for suctioning ventilated neonatal patients.**
Taylor, JE., Hawley, G., Flenady, V & Woodgate, P.G., (December 2011) **Tracheal suctioning without disconnection in intubated ventilated neonates. *Cochrane Database of Systematic Reviews*, 11.**	**I**	• **Reduction in episodes of hypercarbia were a result in the suction procedure without disconnection from ventilator circuit** • **Percentage of heart rate change was smaller if suction was performed without disconnection** • **Improvements in stability of patients in a suction technique was only small and so this should not be the only technique used to suction endotracheal tubes for neonates**

Deep versus shallow suction of endotracheal tubes in ventilated neonates and young infants (2011 Review). Spence, K., Gillies, D,. Cochrane *Database of Systematic Reviews*, 7.	**I**	• **Not enough evidence to support deep suctioning** • **American Association for respiratory Care Guidelines 2010 supports the practice of shallow suctioning techniques for infant and paediatric patients.**
Bunnell, Clinical Considerations for the Bunnell LifePulse High-Fequency Ventilator (2018)	**VII**	• **Guidelines for suctioning during HFJV** • **Procedure for suctioning: Place LifePulse in standby (this step prevents LifePulse alarms from shutting down the ventilator during suctioning. When finished suctioning, press the ENTER button to restart the LifePulse.**