

**Best Evidence Statement (BEST)**

**Date published/posted: August 4, 2008**

**Technique for Suctioning Pediatric Tracheotomies****Clinical Question**

- P (population/problem): In pediatric patients with tracheostomies,  
I (intervention): does suctioning during catheter insertion and removal  
C (comparison): compared with suctioning only during catheter removal  
O (outcome): improve airway clearance?

**Target Population:** Pediatric patients with tracheostomies


**Strength of the Body of Evidence:** Low

**Recommendation:** There is insufficient evidence and lack of consensus to make a recommendation on proper suctioning technique for pediatric tracheostomies. Therefore, it is recommended that research be preformed.

**Discussion/summary of evidence:** Upon literature appraisal, the current evidence is found to be mostly expert opinion or descriptive studies. At this level a recommendation for suctioning technique is provided, but there is lack of rationale or support for these recommendations (*Day 2002 [4a], Derrickson 1991 [4a], Keogh 2008 [4b], Ireton 2007 [5], Oberwaldner 2006 [5], Wilson 2005 [5], Fiske 2004 [5], Wright 2003 [5], Heffner 2001 [5], Sherman 2000 [5], Wood 1998 [5], Musser 1992 [5], Mapp 1988 [5], Albanese 1982 [5], Brown 1982 [5], Kearns 1970 [5]*). Other evidence involves endotracheal tubes (ETT) instead of tracheostomies (trachs) (*Kerem 1990 [4a], Maggiore 2003 [4b], Carroll 1988 [5]*). ETTs and trachs are two separate forms of artificial airway. One difference is endotracheal tubes are much longer than trachs. This affects suctioning time and technique. Given the differences between endotracheal tubes and trachs, recommendations regarding one cannot be applied to another with any confidence. Further more, while a randomized control trial suggested suctioning only on catheter removal, it involves ETT (*Celik 2000 [2b]*). Current Cincinnati Children's Hospital Medical Center (CCHMC) policy/procedure III-403, Tracheotomy Care, dictates suction pressure application on catheter withdrawal only (*Cincinnati Children's Hospital Medical Center 2006 [5]*). Though, this too is without published support. There are no studies that provide valid and reliable evidence to support a proper tracheostomy suctioning technique. Therefore, research is needed to distinguish the best practice when suctioning pediatric tracheostomies.

**Health Benefits, Side Effects and Risks:** When airway clearance is necessary, many children are able to cough and remove phlegm from their respiratory tract. However, if a child requires the placement of a trach the method of expectoration changes. Tracheostomies circumvent the upper airways. These structures serve to "humidify, heat and filter inspired air" (*Ireton 2007 [5]*). The result is thicker, drier secretions. The cilia that help to move secretions for elimination are bypassed. A child with a tracheostomy, whose airways are structurally narrower than that of an adult, especially require proper airway clearance to prevent obstruction (*Ireton 2007 [5]*). Suctioning is essential when managing tracheostomies (*Day 2002 [4a]*). Suctioning comes with risk of "trauma, atelectasis, hypoxemia, laryngospasm, bronchospasm, infection and increased mucous production" (*Ireton 2007 [5]*). As such, it is vital to perform suctioning in a manner that is clinically proven to be the most beneficial despite these risks.

**References/citations** (evidence grade in [ ]; see Table of Evidence Levels following references)

**Note:** When using the electronic version of this document,  indicates a hyperlink to the PubMed abstract. A hyperlink following this symbol goes to the article PDF when the user is within the CCHMC network

1. Albanese, A. J., and Topf, A. D.: *A hassle free guide to suctioning a tracheostomy. RN, 45(4): 24-30, 1982, [5]* [\\_\\_\\_\\_\\_](#) 
2. Brown, I.: *Trach care? Take care--infections's on the prowl. Nursing, 12(5): 45-9, 1982, [5]* [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#)
3. Carroll, P. F.: *Lowering the risks of endotracheal suctioning. Nursing, 18(5): 46-50, 1988, [5]* [\\_\\_\\_\\_\\_](#)  [\\_\\_\\_\\_\\_](#)
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5. *Cincinnati Children's Hospital Medical Center, C.: Nursing Policy Procedure, and Standard III-403 Tracheostomy Care 2006. Cincinnati Children's Hospital Medical Center, Nursing Policies, Procedures, and Standards Manual, 2006, [5]* [\\_\\_\\_\\_\\_](#) 
6. Day, T.; Farnell, S.; Haynes, S.; Wainwright, S.; and Wilson-Barnett, J.: *Tracheal suctioning: an exploration of nurses' knowledge and competence in acute and high dependency ward areas. J Adv Nurs, 39(1): 35-45, 2002, [4a]* [\\_\\_\\_\\_\\_](#) 
7. Derrickson, J. G.; Neef, N. A.; and Parrish, J. M.: *Teaching self-administration of suctioning to children with tracheostomies. J Appl Behav Anal, 24(3): 563-70, 1991, [4a]* [\\_\\_\\_\\_\\_](#) 
8. Fiske, E.: *Tracheostomy home care guide. Adv Neonatal Care, 4(1): 54-5, 2004, [5]* [\\_\\_\\_\\_\\_](#) 
9. Heffner, J. E., and Hess, D.: *Tracheostomy management in the chronically ventilated patient. Clin Chest Med, 22(1): 55-69, 2001, [5]* [\\_\\_\\_\\_\\_](#) 
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12. Keogh, S.; Chitakis, M.; and Watson, K.: *Caring for children with a tracheostomy: a national survey of Australian and New Zealand nurses. Neonatal, Paediatric & Child Health Nursing, 11(1): 10, 2008, [4b]* [\\_\\_\\_\\_\\_](#) 
13. Kerem, E.; Yatsiv, I.; and Goitein, K. J.: *Effect of endotracheal suctioning on arterial blood gases in children. Intensive Care Med, 16(2): 95-9, 1990, [4a]* [\\_\\_\\_\\_\\_](#) 
14. Maggiore, S. M. et al.: *Prevention of endotracheal suctioning-induced alveolar derecruitment in acute lung injury. Am J Respir Crit Care Med, 167(9): 1215-24, 2003, [4b]* [\\_\\_\\_\\_\\_](#) 
15. Mapp, C. S.: *Trach care: are you aware of all the dangers? (continuing education credit). Nursing, 18(7): 34-43, 1988, [5]* [\\_\\_\\_\\_\\_](#) 
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17. Oberwaldner, B., and Eber, E.: *Tracheostomy care in the home. Paediatr Respir Rev, 7(3): 185-90, 2006, [5]* [\\_\\_\\_\\_\\_](#) 
18. Sherman, J. M. et al.: *Care of the child with a chronic tracheostomy. This official statement of the American Thoracic Society was adopted by the ATS Board of Directors, July 1999. Am J Respir Crit Care Med, 161(1): 297-308, 2000, [5]* [\\_\\_\\_\\_\\_](#) 
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Note: Full tables of evidence grading system available in separate document:

- Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality (abbreviated table below)  
<http://groups/ce/NewEBC/EBCFiles/Table-EvidenceLevels.pdf>
- Grading a Body of Evidence to Answer a Clinical Question  
<http://groups/ce/NewEBC/EBCFiles/GradingBodyOfEvidence.pdf>
- Judging the Strength of a Recommendation (abbreviated table below)  
<http://groups/ce/NewEBC/Judgingthestrengthofarecommendation.pdf>

**Table of Evidence Levels** (see note above)

<i>Quality level</i>	<i>Definition</i>
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

**Table of Recommendation Strength** (see note above)

<i>Strength</i>	<i>Definition</i>
“Strongly recommended”	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
“Recommended”	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.

**Dimensions:** In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.

1. Grade of the Body of Evidence (see note above)
2. Safety / Harm
3. Health benefit to patient (*direct benefit*)
4. Burden to patient of adherence to recommendation (*cost, hassle, discomfort, pain, motivation, ability to adhere, time*)
5. Cost-effectiveness to healthcare system (*balance of cost / savings of resources, staff time, and supplies based on published studies or onsite analysis*)
6. Directness (*the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome]*)
7. Impact on morbidity/mortality or quality of life

## Supporting information

**Introductory/background information:** During an orientation informational session, an alternative technique of tracheotomy suctioning was proposed. While CCHMC policy/procedure supports suctioning only on catheter removal, this proposed technique suggested suctioning on insertion as well. The rationale for this alternative was to clear more secretions. Noting this inconsistency, the Transitional Care Center Inquiry Council began a thorough search of current tracheotomy suctioning techniques to determine best practice.

### Group/team members

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### Search strategy:

Databases searched: OVID MEDLINE, EBSCO CINAHL, PUBMED, GOOGLE SCHOLAR

Search terms:

Suction

Tracheostomy

Tracheotomy

Trachea

Limits and filters:

English

Age range: 0-18 years

Humans

Copies of this Best Evidence Statement (BEST) are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address: <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm>  
Examples of approved uses of the BEST include the following:

- copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
- hyperlinks to the CCHMC website may be placed on the organization's website;
- the BEST may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at [HPCEInfo@cchmc.org](mailto:HPCEInfo@cchmc.org) for any BEST adopted, adapted, implemented or hyperlinked by the organization is appreciated.

For more information about CCHMC Best Evidence Statements and the development process, contact Center for Professional Excellence/Research and Evidence-based Practice office at [CPE-EBP-Group@chmcc.org](mailto:CPE-EBP-Group@chmcc.org) for the contact information.

### Note

**This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.**

**Reviewed by** Clinical Effectiveness