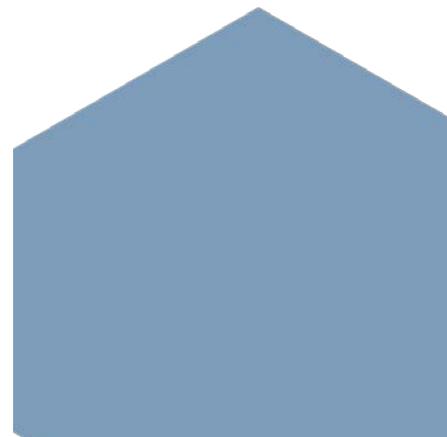
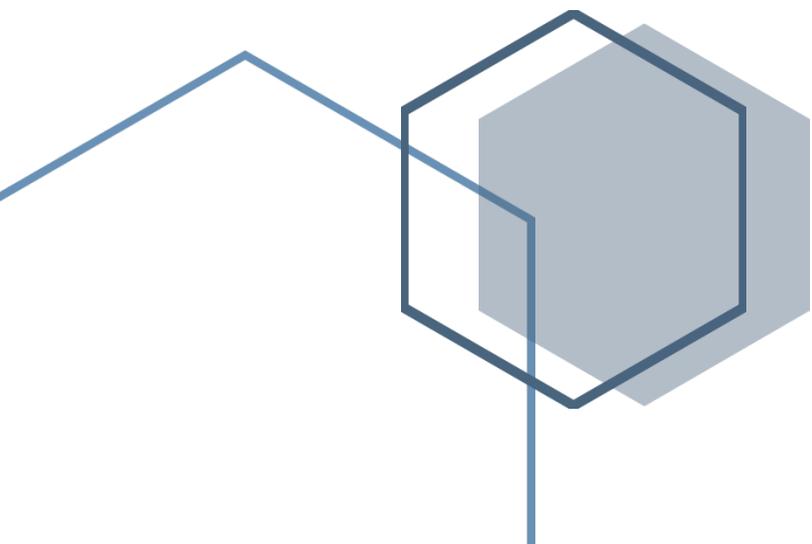




Readings on Chest Tube Stripping

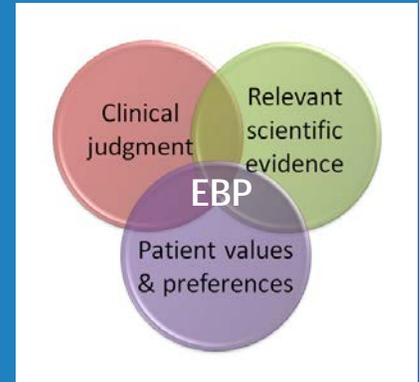
Literature about whether the
benefits of chest tube stripping
outweigh the risks

Evidence-based practice requires a review of the literature, reflecting relevant scientific evidence; the clinician's clinical judgement; and patients' values and preferences.



Readings on Chest Tube Stripping

Evidence-Based Practice



Evidence-based practice is replacing “tradition” as the foundation for much of our bedside practices here in the 21st century.

However, when it comes to surgeons and chest tube management, tradition still reigns. One survey discovered that 72% of nurses were not permitted to strip chest tubes by policy. At the same time, 74% of surgeons expected their patients’ chest tubes were being stripped.²

Chest Drain Literature

Since Duncan and Erickson¹ published their groundbreaking study on the pressures generated by stripping the connecting tubing between the patient’s chest tube and the chest drain, there have been debates about whether chest tubes should or should not be stripped routinely to maintain patency.

Gather 25 critical care nurses with some experience under their belts and you are sure to find at least one who swears to have stripped a chest tube, and removed a clot from the chest with no injury to the patient. That is informed judgement the nurse brings to an evidence-based practice of manipulating chest tubes to enhance drainage.

While evidence-based practice (EBP) is multifactorial, the literature review is the most challenging for most professional nurses. This document provides a list of articles published in the nursing and medical literature about chest tube stripping. A short summary of the contents is provided where appropriate to help nurses decide which resources would be most helpful for answering questions, developing policies and procedures, writing lesson plans, or other clinical applications.

Reviewing the literature is important because a national survey of physicians to determine factors in the selection and management of chest tubes after pulmonary lobectomy provides this nugget:

*The surveyed surgeons “felt that clinical experience - rather than the teaching they received...or published journal articles - was the most important factor” that determines their chest tube management.*³

Nursing Literature

Charnock Y, Evans D: Nursing management of chest drains: a systematic review. *Aust Crit Care* 2001;14(4):156-160.

Systematic review of the literature relating to chest drain care, specifically: dressings, tube manipulation and positioning, and tube removal.

Duncan C, R Erickson: Pressures associated with chest tube stripping. *Heart & Lung* 1982;11:166-171.

The classic reference that first identified very high negative pressures with chest tube stripping demonstrated pressures between -145 cmH₂O and -370 cmH₂O depending on length of tube compressed and -145 cmH₂O -408 cmH₂O when roller was compared to manual technique; pleural pressures were higher than mediastinal pressures. Study measurements were done on 20 men who had postoperative pleural or mediastinal chest tubes; measurements were taken at the juncture of the chest tube and the drainage tubing; suction to the drain was -20 cmH₂O

Duncan C, RS Erickson, RM Weigel: Effect of chest tube management on drainage after cardiac surgery. *Heart & Lung* 1987;16(1):1-9.

This study compared standard care with venting and sump drainage; all chest tubing was stripped with a roller. Chest drains today automatically vent excess negative pressure in the system. This study did not compare tube manipulation techniques.

Gordon PA, Norton JM, Merrell R: Refining chest tube management: analysis of the state of practice. *Dimens Crit Care Nurs* 1995;14(1):6-12.

Compares traditional practices with evidence-based practices relating to suction levels, manipulating chest drain tubing, positioning tubing

Gross SB: Current challenges, concepts, and controversies in chest tube management. *AACN Clin Issues Crit Care Nurs* 1993;4(2):260-275.

This comprehensive, extensively referenced review examines the state of the art of nursing care in 1993, including indications; tube placement; drainage systems; principles relating to chest drainage; controversies including mediastinal bleeding, tube clearance, clamping, tube site care, antibiotics; chest tube removal complications; and autotransfusion

Halm MA: To strip or not to strip? Physiological effects of chest tube manipulation. *Am J Crit Care*. 2007;16(6):609-612.

This clinical evidence review examines the literature relating to drainage tube manipulation and finds no research supporting the practice

Isaacson JJ, Brewer MJ: The effect of chest tube manipulation on mediastinal drainage. *Heart & Lung*. 1986;15:601-605.

Milking compared with stripping showed no difference in drainage in cardiac surgery patients; statistical analysis also showed no difference in drainage between suction pressures of -5 cmH₂O and -20 cmH₂O



Kirkwood P: Are chest tubes routinely milked, stripped, or suctioned to maintain patency? *Crit Care Nurse* 2002;22(4):70-72.

“Ask the Expert” recommends against routine tube manipulation

Lim-Levy F, Babler SA, De Groot-Kosolcharoen J, Kosolcharoen P, Kroncke GM: Is milking and stripping chest tubes really necessary? *Annals of Thoracic Surgery* 1986;42:77-80.

This classic study is one of the first to compare milking, stripping and no manipulation to CABG patients and determined there was no benefit to tube manipulation and recommended avoiding any dependent loops in the drainage tubing.

Oakes LL, Hinds P, Rao B, et al.: Chest tube stripping in pediatric oncology patients: An experimental study. *Am J Crit Care* 1993;2(4):293-301.

This study used fixed randomization within groups of (1) thoracotomy and/or radiation and (2) no such treatment, with 8 patients in each group; half of patients received chest tube stripping Q2 hr for the first 48 hours after thoracotomy, the control group had no tube manipulation. Tube manipulation had no effect on pain, fever or pulmonary complications between the two groups (pain was assessed after tube stripping, not during). Routine stripping is questioned.

Pierce JD, Piazza D, Naftel DC: Effects of two chest tube clearance protocols on drainage in patients after myocardial revascularization surgery. *Heart & Lung* 1991;20(2):125- 130.

Randomized trial compared milking (any compression with twisting or squeezing) with stripping (continuous compression with a roller) when a clot was visible in the drainage tubing. 78/200 patients had no clots; tube manipulation did not improve outcomes and is not recommended

Teplitz L: Update: are milking and stripping chest tubes necessary? *Focus on Critical Care* 1991;18(6):506-511.

This literature review found no research in support of stripping or milking chest tube draining tubing to maintain patency.

Additional Literature

Dango S, W Siemel, B Passlick, C Stremmel: Impact of chest tube clearance on postoperative morbidity after thoracotomy: results of a prospective, randomised trial. *Eur J Cardiothorac Surg* 2010;37(1):51-55.

Randomized trial compared milking (1 min Q 2 hr x 48 hr) with observation and all patients had -20 cmH₂O. Milking significantly increased drainage, but thought to be resulting from stimulation of pleura, not because tube was more patent; no clots were observed in tubes of any patients; advise against routine tube manipulation

Day TG, RR Perring, K Goffon: Is manipulation of mediastinal chest drains useful or harmful after cardiac surgery? *Interact Cardiovasc Thorac Surg* 2008;7(5):888-890.

"Best evidence review" examined the literature and only considered Issacson, Lim- Levy and Pierce to meet inclusion criteria; insufficient evidence to support tube manipulation; given risks illustrated by Duncan, tube manipulation is not recommended

Shalli S, D Saeed, K Fukamachi, et al.: Chest tube selection in cardiac and thoracic surgery: a survey of chest tube-related complications and their management. *J Card Surg* 2009;24(5):503-509.

Survey of North American cardiothoracic surgeons and nurses to identify problems with chest tube management; tube clogging was the leading concern; surgeons tend to choose larger tubes to reduce this risk; 74% of surgeons allow stripping, 23% discourage it and 4% forbid it; 28% of nurses' facilities allow stripping, while 72% do not allow; 75% of nurses agreed that managing chest tube clogging took them away from other important tasks.

Wallen M, A Morrison, D Gillies, E O'Riordan, C Bridge, F Stoddart: Mediastinal chest drain clearance for cardiac surgery. *Cochrane Database Syst Rev* 2004;CD003042 [pii] 10.1002/14651858.CD003042 [doi](2):CD003042.

Cochrane Review found 3 studies that met criteria but could not be combined in meta-analysis; no data to support tube manipulation (milking or stripping) to prevent cardiac tamponade; no evidence to support or reject tube manipulation

References

1. Duncan C, Erickson R: Pressures associated with chest tube stripping. *Heart Lung* 1982;11:166-171.
2. Gordon PA, Norton JM, Merrell R: Refining chest tube management: Analysis of the state of practice. *Dimens Crit Care Nurs* 1995;14(1):6-12; quiz 13.
3. Kim SS, Khalpey Z, Daugherty SL, Torabi M, Little AG: Factors in the selection and management of chest tubes after pulmonary lobectomy: Results of a national survey of thoracic surgeons. *Ann Thorac Surg* 2016;101(3):1082-1088.



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