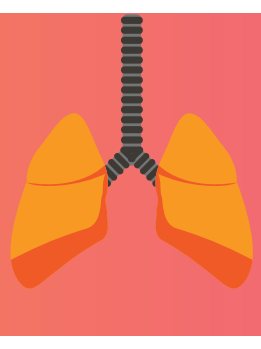
AVANOS

RISKS OF OPEN SUCTION SYSTEMS: A CRITICAL ISSUE FOR ENDOTRACHEAL SUCTIONING



Endotracheal suctioning (ETS) involves the mechanical aspiration of pulmonary secretions from the patient's artificial airway, preventing its obstruction.[1]

Based on the selection of catheter, ETS can be done using an open suction technique and a closed suction technique.[1]

Open suctioning technique (OSS)

- Ventilator must be disconnected from the patient, and the suction catheter is used in an unshielded manner for evacuation of secretions.*,[2]

Closed suctioning technique (CSS)

- Patient does not require to be disconnected from the ventilator, by attaching the in-line suction catheter to the ventilator circuit[1]

*The suction catheter can be introduced through a swivel adaptor of the catheter mount, thus avoiding disconnection from the ventilator.

RISKS INVOLVED WITH OPEN SUCTION SYSTEM

Cross contamination

Aerosol of droplets of secretions is expelled from the connector during passive exhalation by the patient may lead to **increased risk of cross contamination to patients and caregivers**.[2,3]

Environmental contamination can occur up to one meter away from the suction port and can contaminate operator clothes, equipment and surrounding bed linen.[3]

Dissemination of virulent bacteria in the healthcare workers, that can sometimes lead to potentially blinding microbial keratitis.[4]

Interruption to respiratory function

Contributes to negative end-expiratory pressures during endotracheal suctioning and development of atelectasis #,[5]

Increased lung volume loss as compared to closed suctioning[6]

Hemodynamic parameters

Negative effect on the patient's **hemodynamic parameters of heart rate (HR), arterial blood pressure and arterial blood gases**.[7]

OSS may lead to increased arterial blood pressure and HR, that can impair the cardiac rhythm.[7]

While VAP risk between open and closed suction are generally similar, one study reports a **3.5 times greater risk of VAP** in patients on OSS than those on a closed suction systems (CSS).[8]

BENEFITS OF USING CSS

1. **Reduced risk of cross contamination:**

   Use of a CSS helps prevent nosocomial infection:[4]

   - Reduces glove contamination of healthcare workers, protecting healthcare staff[4]
   - Reduces airway contamination during tracheal suctioning[4]

2. **Decreased respiratory disturbances in patients on mechanical ventilation:**

   - Facilitation of oxygenation and continuous mechanical ventilation during suctioning[1]
   - Suggested for use in adults at a risk for lung derecruitment[1]
   - Suggested for adults with high †F_{IO2} or ‡PEEP[1]

Closed suctioning minimizes loss of lung volume compared to open suction due to no disconnection of patient from the ventilator.[1,6]

- Seen to be increasingly **used in mainly patients requiring long-term ventilation**.[6]
- Allows the prevention of **approximately 50% of lung volume fall** observed during suctioning after disconnection.[9]

3. **Decreased hemodynamic disturbances in patients on mechanical ventilation:**[10]

   - Decreased blood pressure changes (lower occurrence of hypertension and hypotension).[11]
   - Decreased heart rate changes (lower occurrence of bradycardia and tachycardia).[11]

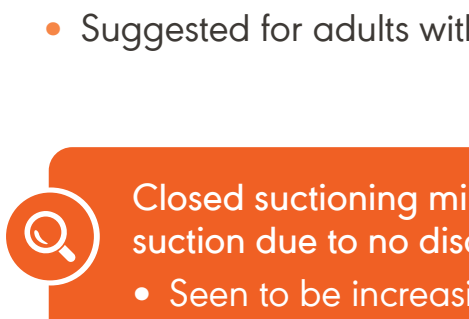
Maintaining a closed ventilator circuit is recommended by the **American Association for Respiratory Care (AARC)**[8]

DID YOU KNOW

As per an AARC recommendation, the use of a closed suction system is considered a part of the **VAP prevention strategy**, and need not be changed daily for infection control purposes.[8]

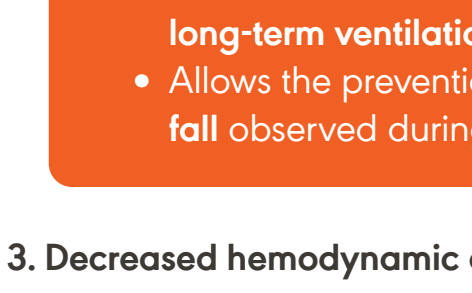
OUR SOLUTION

Avanos offers the following products in the Closed Suction Systems (CSS) portfolio



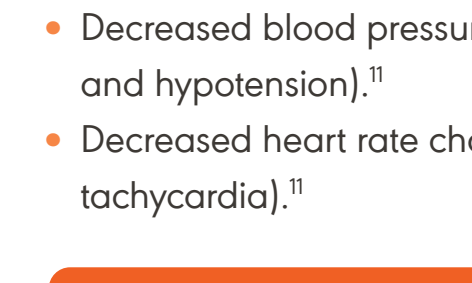
BALLARD* Turbo-Cleaning CSS

Turbulent cleaning chamber creates cleansing action, resulting in a cleaner catheter
PEEP seal helps reduce PEEP loss and inadvertent lavage.



BALLARD*Multi-Access Port CSS

A compact rotating manifold that provides multiple ports to access the patient's airway without jeopardising integrity of the closed circuit.



BALLARD* Neonatal/Pediatric CSS

Number and color coded graduations for measured depth suctioning, helping prevent unnecessary tracheal trauma

#Atelectasis, also known as collapsed lung, is a condition in which the airways and air sacs in the lung collapse or do not expand properly. †F_{IO2}: Fraction of inspired oxygen. ‡PEEP: Positive end-expiratory pressure.

References: 1. American Association for Respiratory Care. Endotracheal suctioning of mechanically ventilated patients with artificial airways 2010. Respir Care. 2010; 55(6):758-64. 2. Lavigne MC. Comparing suctioning techniques used to assist mechanical ventilation: protecting you and your patients. Int. J. Infect. Control. 2016;12:i2. 3. Cobley M, Atkins M, Jones PL. Environmental contamination during tracheal suction: A comparison of disposable conventional catheters with a multiple-use closed system device. Anaesthesia. 1991; 46(11):957-61. 4. Ricard JD, Eveillard M, Martin Y, Barnaud G, Branger C, Dreyfuss D. Influence of tracheal suctioning systems on health care workers' gloves and equipment contamination: A comparison of closed and open systems. Am J Infect Control. 2011; 39(7):605-7. 5. Nakstad ER, Opdahl H, Heyerdahl F, Borchsenius F, Skjønsberg OH. Manual ventilation and open suction procedures contribute to negative pressures in a mechanical lung model. BMJ Open Resp Res. 2017; 4(1):e000176. 6. Corley A, Sharpe N, Caruana LR, Spooner AJ, Fraser JF. Lung volume changes during cleaning of closed endotracheal suction catheters: a randomized crossover study using electrical impedance tomography. Respir Care. 2014; 59(4):497-503. 7. Özden D, Görgülü RS. Effects of open and closed suction systems on the haemodynamic parameters in cardiac surgery patients. Nursing in critical care. 2015; 20(3):118-25. 8. Hess DR, Kallstrom TJ, Mottram CD, Myers TR, Sorenson HM, Vines DL. Care of the ventilator circuit and its relation to ventilator-associated pneumonia. Respir Care. 2003; 48(9):869-79. 9. Maggiore SM, Lellouche F, Pigeot J, et al. Prevention of endotracheal suctioning-induced alveolar derecruitment in acute lung injury. Am J Respir Crit Care Med. 2003; 167(9):1215-24. 10. Afshari A, Safari M, Oshvandi K, Soltanian AR. The effect of the open and closed system suctions on cardiopulmonary parameters: time and costs in patients under mechanical ventilation. Nursing and midwifery studies. 2014; 3(2). 11. Maggiore SM, Lellouche F, Pignataro C, Girou E, Maitre B, Richard JC, Lemaire F, Brun-Buisson C, Brochard L. Decreasing the adverse effects of endotracheal suctioning during mechanical ventilation by changing practice. Respir Care. 2013; 58(10):1588-97.