

A Simple Adaptation for the Convenient Application of Incentive Spirometry in Tracheostomized Critically Ill Patients

Meenupriya Arasu¹, Akhil Kant Singh², Akshay Laguduvah³

Keywords: Incentive spirometry, Inspiratory muscle training, Tracheostomy.

Indian Journal of Critical Care Medicine (2024); 10.5005/jp-journals-10071-24712

Dear Editor,

Inspiratory muscle training is vital in the recovery of critically ill patients to promote pulmonary expansion, airway clearance, and respiratory muscle strengthening, and incentive spirometry aids in achieving this.¹ It is designed by the manufacturer with a mouthpiece adaptor at the patient end.¹ In tracheostomized patients, spirometry use poses two challenges namely, attaching the device while allowing exhalation, and provision for oxygen therapy. The patient end adaptor of the spirometer has to be modified to connect it to the 15 mm universal connector of the tracheostomy tube. We designed a modification using the elbow connector of a breathing circuit and a catheter mount with a double-swivel port (Fig. 1). The flexible part of the catheter mount helps in 360-degree rotation of the spirometer according to patient comfort. The double swivel port has to be occluded with the finger of the respiratory therapist/patient during maximal inspiration and unblocked during expiration (Fig. 2).

Oxygen can be supplemented by connecting oxygen tubing to the gas sampling port of the elbow connector (Fig. 1). The presence of hypoxia in critically ill patients limits the use of flow-oriented incentive spirometry devices without an oxygen supplementation port. The simple adaptation we suggested could aid in lung expansion therapy without interruption of oxygen therapy.

Malhotra et al.² and Goldstein et al.³ have suggested the use of a Wye adaptor for the application of incentive spirometry in tracheostomized patients. Bloria et al. proposed the use of a modified endotracheal tube as an adapter.⁴ These modifications have been demonstrated to be safe in tracheostomized patients.²⁻⁴ We propose another simple, inexpensive adaptation of the incentive spirometer for application in tracheostomized patients. It can be easily made using the catheter mount and elbow connectors, which are ubiquitous in an intensive care unit. Adequate patient cooperation and understanding of the design modification are essential for effective use.

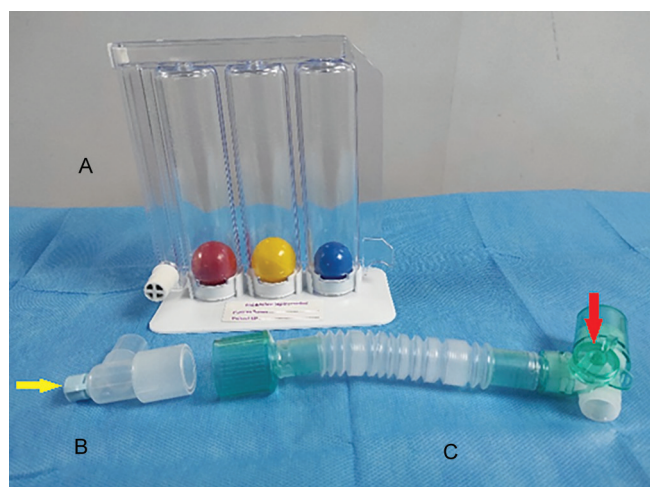
¹⁻³Department of Anaesthesiology, Pain Medicine and Critical Care, All India Institute of Medical Sciences, New Delhi, India

Corresponding Author: Meenupriya Arasu, Department of Anaesthesiology, Pain Medicine and Critical Care, All India Institute of Medical Sciences, New Delhi, India, Phone: +91 7708024354, e-mail: meenupriya1193@gmail.com

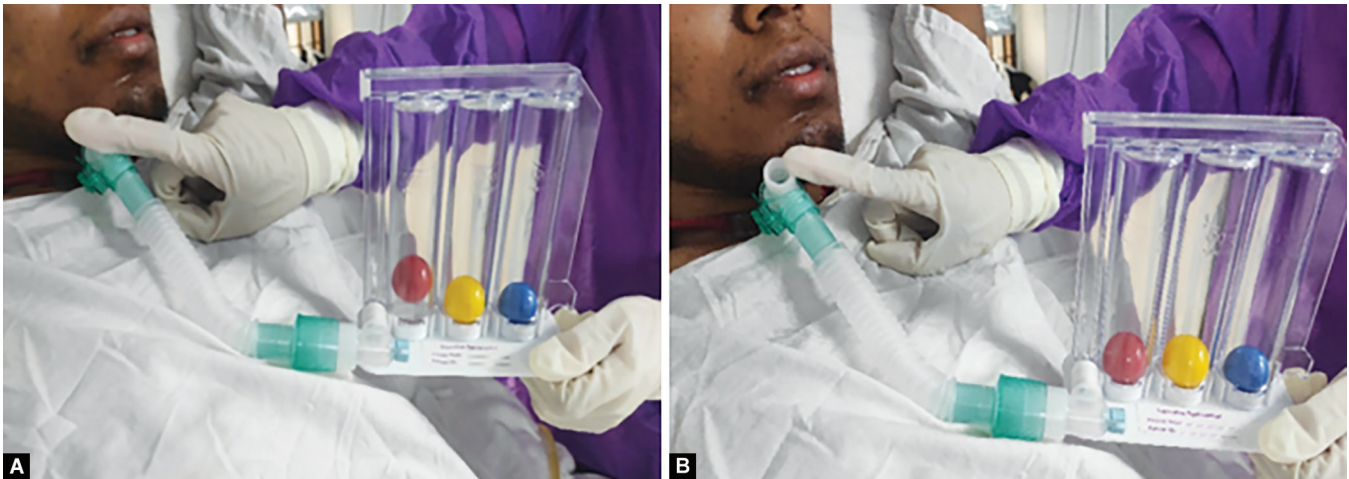
How to cite this article: Arasu M, Singh AK, Laguduvah A. A Simple Adaptation for the Convenient Application of Incentive Spirometry in Tracheostomized Critically Ill Patients. *Indian J Crit Care Med* 2024;28(5):520-521.

Source of support: Nil

Conflict of interest: None



Figs 1A to C: Modified incentive spirometer assembly. (A) Incentive spirometer; (B) Elbow connector with gas sampling port (yellow arrow) for oxygen tubing connection; (C) Catheter mount with double-swivel port and flip-top cap (red arrow) for expiration



Figs 2A and B: Technique of application during the respiratory cycle. (A) Occlusion of the double-swivel port during inspiration; (B) Venting of the double-swivel port during expiration

ORCID

Meenupriya Arasu  <https://orcid.org/0000-0002-2744-8716>

Akhil Kant Singh  <https://orcid.org/0000-0002-6662-9819>

Akshay Laguduvah  <https://orcid.org/0009-0008-3172-5190>

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