

# Active Cycle of Breathing Technique: A Respiratory Modality to Improve Perioperative Outcomes in Patients With Lung Cancer

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**BACKGROUND:** Cancer and surgery put a physiologic and psychological burden on patients with lung cancer. The active cycle of breathing technique (ACBT) has been considered as an effective airway clearance method for patients with lung diseases. Its effectiveness on perioperative outcomes in patients with lung cancer warrants study.

**OBJECTIVES:** This prospective study explored the effects of the ACBT on patients with lung cancer undergoing surgical resection.

**METHODS:** Patients were randomly allocated to the intervention (N = 34) or control group (N = 34). The intervention group received the ACBT, and the control group received usual pre-/postoperative breathing exercises. Outcomes included dyspnea, exercise capacity, anxiety, depression, and postoperative pulmonary complications. Intention-to-treat analysis was also performed.

**FINDINGS:** Dyspnea, anxiety, depression, and postoperative pulmonary complications were significantly improved at discharge for patients in the intervention group.

## KEYWORDS

lung cancer; active cycle of breathing technique; pulmonary rehabilitation

## DIGITAL OBJECT IDENTIFIER

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**LUNG CANCER IS THE SECOND MOST COMMON CANCER** worldwide, comprising 11% of all cancer incidence (Sung et al., 2021). About 85% of lung cancer diagnoses are non-small cell lung cancer (Peddle-McIntyre et al., 2019). Treatments for patients with lung cancer include surgery, immunotherapy, chemotherapy, and radiation therapy, but surgical resection remains the primary treatment, particularly for patients with early-stage lung cancer (Onugha & Lee, 2016). The National Comprehensive Cancer Network (2021) guidelines recommend that video-assisted thoracic surgery lobectomy be used as a standard surgical procedure for radical treatment of lung cancer. Considering the series of symptom burden caused by surgery and lung cancer itself, efforts to improve perioperative outcomes are crucial.

Surgery for lung cancer can cause physiologic changes, such as decreased vital capacity and diaphragm activity, changes in pulmonary and capillary structures, and increased respiratory secretions (Templeton & Greenhalgh, 2019). Because of cough reflex reduction, physical function decline, and slowed tracheal ciliary movement after surgery, patients may have trouble expectorating (Rui & Duan, 2015). Surgical trauma, the presence of a chest tube, and pain also make it difficult for patients to take effective deep breaths, cough, and remove secretions, all of which can frequently lead to postoperative pulmonary complications and increase mortality rates (Agostini et al., 2018). Dyspnea, one of the most prevalent symptoms among patients with lung cancer, worsens after surgery, comprising 10%–15% of lung function loss (Damani et al., 2019; Gu et al., 2018). Dyspnea is also associated with poor prognosis and deteriorating quality of life in patients with non-small cell lung cancer (Ban et al., 2016). Lung parenchyma resection and following adverse symptoms may limit patients' exercise capacity. In addition, postoperative physical discomfort is related to psychosocial distress, including anxiety and depression, which affects patients' quality of life. Therefore, it is imperative to adopt strategies to clear airway secretions and improve perioperative symptoms to achieve rapid recovery. Considering that preoperative breathing exercises can effectively improve patients' tolerance to surgery and subsequent treatment, implementing interventions throughout the perioperative period, not just postoperatively, warrants discussion and exploration (Liu, 2019).