014

Inspiratory muscle training for chronic critically ill patients: a systematic review and meta-analysis

Gustavo Rodrigues das Chagas[1], Aléxia Gabriela da Silva Vieira[1], Jamile Caroline Garbuglio de Araújo[1], Raquel Caserta Eid[1], Caroline Gomes Mól[1], Ricardo Kenji Nawa[1,2]

[1] Hospital Israelita Albert Einstein, São Paulo, SP, Brazil.
[2] Faculdade Israelita de Ciências da Saúde Albert Einstein, Hospital Israelita Albert Einstein, São Paulo, SP, Brazil.

Category: Pneumology

DOI: 10.31744/einstein_journal/2024ABS_EISIC_MV014

Corresponding author
gustavo.chagas@einstein.br

Introduction: The evolution of care for critically ill patients has saved many lives around the world.[1] Nevertheless, the increased number of survivors of critically ill episodes has also given rise to a substantial and expanding population of chronically critically ill patients (CCIP) who rely on mechanical ventilation (MV) support and other intensive care therapies for an extended period of time.[1-3] The prolonged MV support and other prevalent conditions encountered during intensive care unit (ICU) hospitalization are associated with the development of clinical conditions that become a challenge for physical rehabilitation, such as peripheral muscle weakness and dysfunction of the diaphragm.[4-6] However, in order to improve patients' respiratory muscle strength, the inspiratory muscle training (IMT) is considered a good alternative, reducing symptoms like dyspnea, and possibly contributing to improving successful weaning rate.[7,8] Although several studies showing the effectiveness of IMT in patients undergoing MV support have been published, its applicability to CCIP remains uncertain. **Objective:** The purpose was to assess whether inspiratory muscle training is associated with enhancements in muscle strength among CCIP. **Methods:** This review was performed following the PRISMA guidelines,[9,10] and the methodological recommendations of the Cochrane Collaboration Handbook.[11] MEDLINE, Embase, Cochrane Central, and LILACS, Clinical Trials Registry, and World Health Organization databases performed on November 24, 2022, and updated on July 11, 2023. Titles and abstracts were screened independently and in duplicate to identify potentially eligible studies, and then a full text was utilized for eligibility. Characteristics and outcome data from included studies were independently extracted by two investigators and revised by a third investigator, using a data collection form for outcomes previously defined. For analysis, the RevMan V5.4 software was used, adopting the mean difference or standardized mean difference with 95% confidence interval (95%CI) for continuous variables or risk ratio with 95% CI for dichotomous outcomes. The GRADE system was used to measure and summarize the overall certainty of the current evidence of each outcome. **Results:** A total of 6,867 records were identified through the initial search, and after excluding duplicates, 6,304 unique reports were screened. Following the assessments of titles, abstracts, and full texts, 16 reports from 7 studies were included in this systematic review, with a total of 434 participants. The IMT showed a significant increase in the inspiratory muscle strength comparing IMT *versus* usual care, mean difference -8.37 (95%CI=-15.21 to -1.52), with very low certainty of evidence. **Conclusion:** IMT has demonstrated an association with better outcomes of inspiratory muscle strength compared to usual care and sham groups.

REFERENCES

1. Nelson JE, Cox CE, Hope AA, Carson SS. Chronic critical illness. Am J Respir Crit Care Med. 2010;182(4):446-54. Review.
2. Damuth E, Mitchell JA, Bartock JL, Roberts BW, Trzeciak S. Long-term survival of critically ill patients treated with prolonged mechanical ventilation: a systematic review and meta-analysis. Lancet Respir Med. 2015;3(7):544-53. Review.

3. Kahn JM, Le T, Angus DC, Cox CE, Hough CL, White DB, et al. The epidemiology of chronic critical illness in the United States*. Crit Care Med. 2015;43(2):282-7.
4. Jordan J, Rose L, Dainty KN, Noyes J, Blackwood B. Factors that impact on the use of mechanical ventilation weaning protocols in critically ill adults and children: a qualitative evidence-synthesis. Cochrane Database Syst Rev. 2016;10(10):CD011812. Review.
5. Dres M, Dubé BP, Mayaux J, Delemazure J, Reuter D, Brochard L, et al. Coexistence and Impact of Limb Muscle and Diaphragm Weakness at Time of Liberation from Mechanical Ventilation in Medical Intensive Care Unit Patients. Am J Respir Crit Care Med. 2017;195(1):57-66.
6. Dres M, Goligher EC, Heunks LM, Brochard LJ. Critical illness-associated diaphragm weakness. Intensive Care Med. 2017;43(10):1441-52. Review.
7. Elkins M, Dentice R. Inspiratory muscle training facilitates weaning from mechanical ventilation among patients in the intensive care unit: a systematic review. J Physiother. 2015;61(3):125-34. Review.
8. Moodie L, Reeve J, Elkins M. Inspiratory muscle training increases inspiratory muscle strength in patients weaning from mechanical ventilation: a systematic review. J Physiother. 2011;57(4):213-21. Review.
9. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. J Clin Epidemiol. 2009;62(10):e1-34.
10. Cumpston M, Li T, Page MJ, Chandler J, Welch VA, Higgins JP, Thomas J. Updated guidance for trusted systematic reviews: a new edition of the Cochrane Handbook for Systematic Reviews of Interventions [Editorial]. Cochrane Database Syst Rev. 2019;10(10):ED000142.
11. Higgins J, Green S, editors. Cochrane handbook for systematic reviews of interventions: Cochrane book series. Hoboken, NJ: Wiley-Blackwell; 2008. 672 p.