Tehran University of Medical Sciences

Nursing Practice Today

2022; Volume 9, No 4, pp. 259-260

Editorial

Success and failure of non-invasive mechanical ventilation in the management of patients with COVID-19

Maryam Esmaeili

Nursing and Midwifery Care Research Center, Critical Care Nursing Department, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

Therapeutic support and care of patients with respiratory disorders require quick decisions and careful considerations (1). Non-invasive mechanical ventilation (NIV) has a significant role in managing respiratory failure resulting from various conditions. Non-invasive mechanical ventilation is not recommended to manage severe acute respiratory failure syndrome (2). After dealing with the Covid-19 pandemic for more than two years, there are still many uncertainties about the success rate of NIV in the respiratory care of patients with Covid-19.

There are also many questions about the effectiveness of this method compared to other treatments and supports, such as high-flow oxygen therapy or invasive mechanical ventilation. In this regard, paying attention to scientific evidence can help answer these questions and resolve uncertainties. In this editorial, by considering clinical experiences and general results of some important studies on the success or failure of non-invasive mechanical ventilation, the author intends to convince interested researchers to conduct more prosperous studies on this subject. Non-invasive mechanical ventilation was widely used during the Covid-19 pandemic as a method of respiratory support, although the failure to use NIV was also associated with high mortality (3, 4). Studies conducted during the Covid-19 pandemic report different results on the success and failure of NIV. For example, the results of a large study showed that the failure rate of NIV was about 55.5%. The reasons for this failure were; reduced level of consciousness, patient fatigue, resistant hypoxia, sepsis, and instability of hemodynamic conditions (5). The success rate of NIV was also about 72.1%, and the death rate was about 24.6% in another study, which also showed that the failure rate of NIV was high in elderly patients, patients with high respiratory rate, and patients with high PaCO2 and D-dimer levels (6).

Based on these results, choosing the right patient based on clinical and laboratory findings and imaging characteristics can be a cornerstone in reducing ICU distress and NIV failure (2). Therefore, the detection of underlying factors is effective in predicting the success or failure of NIV. On the other hand, many studies show that although non-invasive mechanical ventilation is safer and more accessible than other methods, its failure is associated with higher mortality, increased length of hospital stay, and more side effects (7,8). The results of a multicenter study showed that 43% of patients who were intubated after NIV failure expired, and the reasons for that were; the failure to appropriately select patients for NIV and not considering the conditions or the correct method of NIV (9). Meanwhile, it is crucial to consider the age and other underlying factors in choosing the NIV method, which is sometimes neglected. Recently, Charlson's index of underlying diseases, along with PaO2/Fio2 ratio, CPK, and INR, has been

*Corresponding Author: Maryam Esmaeili, Nursing and Midwifery Care Research Center, Critical Care Nursing Department, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran. Email: esmaeili_m@tums.ac.ir

DOI: https://doi.org/10.18502/npt.v9i4.11197

Please cite this article as: Esmaeili M. Success and failure of non-invasive mechanical ventilation in the management of patients with COVID-19. Nursing Practice Today. 2022; 9(4):259-260

considered one of the essential indexes in identifying the risk of NIV failure. This index shows whether the presence of underlying conditions, such as hypertension, obesity, diabetes, heart and kidney diseases, cardiac arrhythmia, atrial fibrillation, and liver diseases, can lead to the failure of NIV (6). What is important in considering or not considering mechanical ventilation is choosing the right patient in favorable conditions as well as competent staff familiar with the equipment and use of non-invasive mechanical ventilation; otherwise, the failure rate of NIV will be higher. Currently, there are several approaches to improve oxygenation in acute respiratory failure, and choosing to use each of them requires careful monitoring of the patient and considering appropriate parameters to start the treatment (10).

In general, non-invasive mechanical ventilation is a safe, effective, and cost-effective treatment for people with respiratory failure, which can reduce the duration of hospitalization in the ICU, but selecting the right patients is crucial, taking into account high-risk underlying factors. Respiratory failure is one of the essential factors in the success or failure of NIV, which the healthcare team should consider. The difference in the results of studies in terms of the success and failure rates of NIV shows that conducting more studies with a richer methodology, or reporting the results in the form of retrospective studies based on the available data, especially in Iran, can add to the body of knowledge in this area. It can also help to make better clinical decisions in the future.

Conflicts of Interest

There are no conflicts of interest.

References

1. Chacko B, Thomas L, Sharma R, Yadav B, Jeyaseelan L, Arul AO, et al. Noninvasive Ventilation in the Management of Respiratory Failure Due to COVID-19 Infection: Experience From a Resource-Limited Setting. Mayo Clin Proc. 2022 Jan;97(1):31-45. doi: 10.1016/j.mayocp.2021.10.002.

2. Akoumianaki E, Ischaki E, Karagiannis K, Sigala I, Zakyn-Thinos S. The Role of Non-invasive Respiratory Management in Patients with Severe COVID-19 Pneumonia. Journal of Personalized Medicine. 2021 Sep 3;11(9):884. doi: 10.3390/jpm11090884.

3. Innocenti F, Lazzari C, Paolucci E, De Paris A, Lagomarsini A, Guerra F, et al. Role of prognostic scores in predicting in-hospital mortality and failure of non-invasive ventilation in adults with COVID-19. Internal and Emergency Medicine. 2022 Aug 2:1-1. https://doi.org/10.1007/s11739-022-03058-x.

4. Radovanovic D, Coppola S, Franceschi E, Gervasoni F, Duscio E, Chiumello DA, et al. Mortality and clinical outcomes in patients with COVID-19 pneumonia treated with non-invasive respiratory support: a rapid review. Journal of critical care. 2021 Oct 1;65:1-8.

5. Boscolo A, Pasin L, Sella N, Pretto C, Tocco M, Tamburini E, Rosi P, Polati E, Donadello K, Gottin L, Vianello A. Outcomes of COVID-19 patients intubated after failure of non-invasive ventilation: a multicenter observational study. Scientific reports. 2021 Sep 6;11(1):1-9.

6. Romanelli A, Toigo P, Scarpati G, Caccavale A, Lauro G, Baldassarre D, Oliva F, Lacava G, Pascale G, Piazza O. Predictor factors for non-invasive mechanical ventilation failure in severe COVID-19 patients in the intensive care unit: a single-center retrospective study. Journal of Anesthesia, Analgesia and Critical Care. 2022 Dec;2(1):1-3.doi.org/10.1186/s44158-022-00038-7.

7. Jayasimhan D, Martynoga RA, Fairweather SM, Chang CL. Non-invasive ventilation for acute hypoxaemic respiratory failure: A propensity-matched cohort study. BMJ Open Respir Res. 2022 May;9(1):e001149. doi: 10.1136/bmjresp-2021-001149.

8. Avdeev SN, Yaroshetskiy AI, Tsareva NA, Merzhoeva ZM, Trushenko NV, Nekludova GV, et al. Non-invasive ventilation for acute hypoxemic respiratory failure in patients with COVID-19. The American Journal of Emergency Medicine. 2021 Jan 1;39:154-7.

9. Zhou A, Song Q, Peng Y, Deng D, Liao X, Huang P, Liu W, Xiang Z, Liu Q, Jiang M, Huang X. The Effect of Non-invasive Ventilation Support on COVID-19 Patients and Risk Factors for Invasive Ventilation–A Retrospective and Multicenter Study. International Journal of General Medicine. 2021;14:6085-92.

10. Wang Z, Wang Y, Yang Z, Wu H, Liang J, Liang H, et al. The use of non-invasive ventilation in COVID-19: A systematic review. Int J Infect Dis. 2021 May;106:254-61. doi: 10.1016/j.ijid.2021.03.078