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LETTER TO THE EDITOR

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Nursing management for COVID-19 patients with ECMO treatment

To The Editor,

We have read with great interest the article by Haiduc et al.[1] about examining the literature evidence behind using extracorporeal membrane oxygenation (ECMO) in patients with coronavirus disease 2019 (COVID-19) in a systematic review manner. Here, we congratulate the authors for the quality of their work, which provides an up-to-date reference review about this tough situation. In particular, we appreciate the authors' efforts to highlight the paucity of evidence and the need for further data to consolidate the efficacy of ECMO in improving patient outcomes. The authors emphasized that risk-benefit analysis for each candidate should be conducted thoroughly so that patients that have an increased probability of survival can benefit from this scarce resource. But at the same time, we must realize that nursing work also plays a great role in the success of ECMO treatment in patients with COVID-19. From February 9 to March 28, 2020, a total of nine patients with severe COVID-19 undergoing ECMO treatment in our center. The purpose of this letter is to summarize our experience of respiratory management, ECMO anticoagulation and pipeline safety, and psychological care of nursing staff for severe patients with COVID-19.

Patients who use an invasive ventilator to assist breathing should choose a closed sputum suction tube to suck sputum, which can reduce the chance of aerosol dissemination. Nurses should pay attention to the color, character, and quantity of sputum in the operation. In this study, three patients were difficult to inhale due to thick sputum. We controlled the airway humidification water within the normal calibration range of the water level line marked by the humidification tank to avoid airway dryness caused by too little humidification water. We set the heating and humidification options of the ventilator to the highest grade, appropriately increase the frequency and time of ambroxol atomization inhalation and other measures to achieve the purpose of humidifying the airway and diluting sputum. In addition, we can effectively clean up the respiratory tract by turning over and patting the back to vibrate the sputum to loosen. It should be noted that stimulation operations such as systemic anticoagulant therapy and sputum aspiration increase the risk of airway mucosal hemorrhage in patients with ECMO.

We also believe that ECMO combined with prone position ventilation can effectively improve the oxygenation status of patients with severe pneumonia. Because due to gravity, a large amount of sputum will be discharged, and P/F will be increased. To avoid the pressure injury caused by the forehead pressing directly on the mattress, surgical examination gloves are used to irrigate and tie a knot, and a water bag is made and placed under the patient's forehead, which not only plays a role in decompressing the forehead and nose and face but also plays a supporting role in keeping the airway unobstructed.

ECMO patients need analgesia, sedation, and muscle relaxation therapy in the early stage. To reduce complications such as sedation drug accumulation, nurses need to wake up the patients every day to evaluate the patients' consciousness state. In the middle and late stages of ECMO treatment, the patient's vital signs tend to be stable. At this time, preparations should be made for the withdrawal of the machine. Nurses should make a comprehensive judgment according to the patient's state of consciousness, degree of cooperation, vital signs, and so forth, and stop analgesic, sedative, and muscle relaxant drugs as prescribed.

Systemic heparinization anticoagulation is a key measure to maintain the normal operation of ECMO,[2] and its greatest nursing risk is hemorrhage, which requires nurses to strengthen coagulation monitoring and communicate with clinicians in a timely manner during treatment. Our department carried out coagulation tests every 2 h for patients. To effectively monitor the performance of the oxygenator, we require nurses to measure the blood gas after the oxygenator membrane every 8 h. The action after blood collection must be gentle and rapid to avoid the three-way tube from loosening. After blood collection, the three-way tube must be flushed with 5 ml normal saline positive pressure pulse to exhaust air and avoid air embolism. Nurses should also flush the tee without blood stains, and then seal the tee with a positive pressure joint to prevent thrombosis. At the same time, the principle of hand hygiene must be strictly implemented, and the ECMO pipeline must not be opened except for blood gas after membrane examination and CRRT pipeline connection, so as to avoid blood flow-related infection. Nurses should use medical disinfection wet wipes to wipe the surface of the machine and pipelines every day.

ECMO pipes shall be properly fixed. Nurses use a sterile cotton pad or sterile gauze to separate the pipeline from the skin. The head pipeline is fixed by lifting it up and down from the forehead around the head with 3M-wide adhesive tape. The leg pipeline is fixed by lifting it up and down with 3M-wide adhesive tape to keep the vascular access parallel to the body's long axis.[2]

For sober patients, psychological health education and humanistic nursing should be implemented. Mental nursing methods such as the mindfulness decompression method should be used to relieve patients' anxiety, fear, and other negative emotions and increase their compliance with treatment. Individualized nursing and early

functional rehabilitation exercise should also be implemented after ECMO withdrawal to enhance patients' rehabilitation confidence.

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