

# EMS can prevent limb and respiratory muscle weakness in ICU patients

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Electrical muscle stimulation (EMS) can prevent critical illness polyneuromyopathy (CIPNM), according to Greek researchers. CIPNM is an acquired limb and respiratory muscle weakness that is a common and serious problem among intensive care unit patients, and can result in prolonged ICU and hospital stay. EMS can also shorten the duration of weaning from mechanical ventilation and the length of ICU stay.

The study will be presented at the ATS\*2010 International Conference in New Orleans.

"CIPNM is a very common complication of [critical illness](#) and ICU stay affecting approximately one-quarter of ICU [patients](#) and is characterized by profound muscle weakness or even paralysis. No preventive tool has been reported so far for critical illness polyneuromyopathy," said Serafim Nanas, M.D., associate professor at the National and Kapodistiran University of Athens, First Critical Care Medicine Department, and the principal investigator of the study. "ICU patients undergo long periods of immobilization due to prolonged sedation and mechanical ventilation which have been shown to have detrimental effects on skeletal muscle mass within a few days after ICU admission."

EMS has shown beneficial results in patients with end stage chronic [heart failure](#) and severe COPD in terms of exercise capacity, muscle strength and quality of life. EMS has also been used in patients with COPD under mechanical ventilation following ICU stay with beneficial results in terms of muscle strength.

"In patients with severe cardiac and/or respiratory insufficiency that prevents active exercise, EMS is an alternative form of exercise that is well tolerated and has minimal aerobic requirements," explained Dr. Nanas. "Furthermore, EMS does not require patient cooperation and can therefore be implemented in sedated ICU patients."

To determine whether EMS could prevent/reduce the incidence of CIPNM in critical care patients, Dr. Nanas and colleagues recruited 140 critically ill patients with an Apache II admission score of >13, indicating a relatively higher disease severity and greater risk for developing CIPNM. Patients assigned to EMS received daily 45-minute treatment sessions on both lower extremities. EMS was implemented simultaneously on the quadriceps and peroneous longus (a calf muscle). EMS sessions were continued until ICU discharge, an average of 14 days, ranging from four to 62 days.

After awaking, the patients were assessed for muscle strength by two independent examiners, and duration of ventilation weaning and ICU stay were recorded.

"We anticipated that electrical muscle stimulation implementation could reverse the detrimental effects of critical illness on skeletal muscle and preserve the muscle mass of these patients," said Dr. Nanas.

Indeed, the EMS treatment group showed a significant reduction in the risk of developing CIPNM. Of the 68 patients in the EMS group, three were diagnosed with CIPNM (four percent), compared to 11 of the 72 patients in the control group (15 percent). Furthermore, muscle strength was significantly better in the EMS group as compared to the control group. Patients with CIPNM had both longer weaning periods and ICU stays than those who did not develop CIPNM.

"Electrical muscle stimulation is a promising preventive tool for critical

illness polyneuromyopathy, a common complication of critical illness which is associated with increased duration of ICU stay, morbidity and mortality," said Dr. Nanas.

"CIPNM is a common but at the same time long-overlooked complication of critical illness, which bears serious and long term sequelae in terms of functional disability and quality of life. Data from our study suggest that if it is promptly and properly addressed, early on during ICU stay, it can significantly impact on the length of hospital stay and more importantly on the functional ability and the quality of life of these patients."

Dr. Nanas noted that further studies will be needed to fully assess and optimize the benefits of EMS in an ICU setting. "The application of EMS in patients after they are discharged from the ICU to improve and restore the muscle function should also be further evaluated, as should the long term effect in muscle function and quality of life of electrical muscle stimulation that has been applied during ICU stay."

Provided by American Thoracic Society

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