

Shorter ventilation in ICU thanks to electrical stimulation?

FITNESS FOR THE RESPIRATORY MUSCLES

ICU patients on mechanical ventilation do not use their respiratory muscles, which weakens them. As a result, patients may be on life support for longer and some may need to be resuscitated after being taken off the ventilator. In an international context, Radboudumc and other centres are investigating whether electrical stimulation of the respiratory muscles can help patients to be resuscitated less often and for shorter periods of time.

Muscles shrink when they are not used. This applies to arm and leg muscles, as well as the respiratory muscles. A patient who has been on a ventilator for a while in the intensive care unit (ICU), will eventually start breathing on their own again. “We then remove the tube from the patient’s throat”, says Professor Leo Heunks, head of the ICU department. “But if they don’t start breathing on their own, which happens to 1 in 5 patients, we put them back to sleep and reinsert a breathing tube. Of course, we want to know why these patients fail to breathe on their own. Research shows us that this is mainly because they cannot breathe out and



The device

cough hard enough. In these cases, the lungs slowly fill up with mucus and sputum and the patient has to go back on the ventilator. So, weakened respiratory muscles seem to be the problem.”

Respiratory muscle fitness

When we breathe in, we use the muscles of the diaphragm and when we breathe out, we use the abdominal wall muscles. The question is how to counteract the weakening of the abdominal wall muscles. A US device has given a new perspective. Heunks: “In theory, it is easy to electrically stimulate the respiratory muscles of patients on mechanic ventilation in intensive care. For example, you can have patients do breathing exercises twice a day for half an hour with stickers on their abdomen that are perfectly attuned to everyone’s personal breathing rhythm. This is a way of keeping the respiratory muscles fit, and hopefully preserving muscle mass and strength remain as much as possible.”

Shorter ventilation

At an earlier stage, Heunks tested the stimulator on twenty intensive care patients from various hospitals in the Netherlands. The device was indeed found to stimulate the muscles, and there was little or no loss of muscle mass. “Hopeful results,” says Heunks, “but what you really want to know is whether ICU patients can be taken off life support sooner as a result. And whether this respiratory fitness makes them less likely to need a breathing tube for a second time.”

Lower cost

The procedure is relatively simple and low-risk. Heunks: “If our research shows that the procedure actually works, that is first and foremost wonderful news for the patient. The sooner someone can get out of ICU, the better. And it’s also better for someone if we have to resuscitate them less often.” It is also economically advantageous because a stay in a Dutch ICU easily costs around 3,000 euros per patient per day. If you can shorten the length of stay of a large group of patients by one day, then you are talking about huge cost savings.

Scientific prove

The device has a CE mark, which allows it to be used in European hospitals. “We are already using it regularly in our ICU,” says Heunks, “because it is so obvious that it can work. But that is also a big pitfall. Medical treatments must be based on sound and systematic research. We have to prove scientifically that it works. That is why our current research is essential.”



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