

Kentucky research looks at respiratory weakness in ICU morbidity

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A University of Kentucky researcher is investigating respiratory weakness as a factor in the morbidity of intensive-care patients and will soon be testing new treatments that could improve long-term patient outcomes while reducing costs of care.

Dr. Gerald Supinski, professor and vice chair of research for the Department of Internal Medicine in the University of Kentucky College of Medicine, was awarded a highly competitive, two-year, \$480,000/year NIH Challenge Grant for the project.

Supinski suggests that [patients](#) who are exposed to prolonged mechanical ventilation in the [intensive care unit](#) (ICU) develop weakness in the skeletal muscles, which control breathing as well as body movement. He believes that muscle wasting is a significant factor in both extended ICU stays and the lengthy recovery times required after a patient has been removed from the ventilator.

Most patients exposed to extended mechanical ventilation experience lasting damage, Supinski says.

"Only about 50 percent will return to their previous level of functioning within 9-12 months, and many will have damage lasting five years or longer," he said.

Supinski further hypothesizes that physicians tend to significantly underestimate both the degree of patient weakness and the length of time

that the patients will require mechanical ventilation. If effective treatments can be developed to slow down the wasting process, Supinski reasons, reliance on mechanical ventilation can be reduced and recovery times will improve.

Over the past 20 years there has been a steady increase in the use of [mechanical ventilation](#), which currently accounts for around \$150 billion in U.S. medical costs each year. That's roughly 6 percent of the country's total medical expenditures and nearly 1 percent of the U.S. gross national product.

"When you think of the costs to society - not just the medical costs, but the loss of productivity and quality of life - it really is quite huge," Supinski said.

The first phase of the research involves assessing the respiratory strength of patients in the ICU. Supinski uses a measurement known as "PDi twitch," which gauges pressures across the diaphragm, the abdominal muscle used in breathing. A painless electrical stimulus is given to patients on either side of the neck, triggering nerves that cause the diaphragm to twitch. The twitch results in a change in pressure in the esophagus, which can be measured. The lower the pressure change, the greater the degree of weakness. This provides a more objective measurement than other pulmonary function tests such as spirometry, which requires patients to exhale forcefully into a tube.

"Sometimes you can't be sure whether a patient is truly giving you full effort, especially when the patient is already weak" Supinski said. "This takes effort out of the equation."

The second phase will involve testing new treatments to slow down muscle wasting in ICU patients. Two drugs that show promise are eicosapentaenoic acid (EPA) and N-acetylcysteine (NAC). Both are

generally regarded as safe and have a well-established history of use in humans. EPA is a component of fish oil, and NAC is derived from the amino acid cysteine. Both are currently sold as dietary supplements in the United States.

Provided by University of Kentucky

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