Mild exercise while in the ICU reduces bad effects of prolonged bed rest

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Critical care experts at Johns Hopkins are reporting initial success in boosting recovery and combating muscle wasting among critically ill, mostly bed-bound patients using any one of a trio of mild physical therapy exercises during their stays in the intensive care unit (ICU).

"ICU-related muscle weakness is the number one factor in prolonging a patient's recovery and delaying their return to a normal life, including work and recreational activities," says critical care specialist Dale Needham, M.D., Ph.D., the senior researcher involved in producing the report, to be published in the journal *Critical Care Medicine* online Sept. 21.

"Our ICU patients are telling us that they want to be awake and moving. Gone are the days when we should only think of critically ill patients on complete bed rest," says Needham, whose 2008 publication in the Journal of the American Medical Association reported that a majority of ICU patients experienced prolonged fatigue and delayed recovery after bed rest.

In the new report, Needham and colleagues describe muscle-strengthening exercises that can be introduced early into the treatment plans of critically ill patients. Needham's team, including two physical therapists, have used these exercises in treating over 400 patients in The Johns Hopkins Hospital's medical ICU in the last year.

Although longer follow-up is needed, Needham and his team say their

early approach to having patients exercise while in the ICU is showing signs of success, with patients leaving the hospital sooner, stronger and happier.

Some of the ICU patients are undergoing electrical stimulation to strengthen leg muscles, getting up to walk around the ICU, and even cycling while lying in bed using a specially designed device attached to the end of the bed.

Experts say there are plenty of data suggesting that long periods of bed rest, even episodes lasting a few days, can lead to significant muscle weakness. In some studies, patients have lost as much as 5 percent per week of leg muscle mass.

Developing physical therapy regimens for ICU patients requires good planning, says Needham, an assistant professor at the Johns Hopkins University School of Medicine, because most of the patients are on mechanical ventilators to help them breathe, and some are also sedated while undergoing treatment.

In neuromuscular electrical stimulation, a technique used to hasten recovery in injured athletes, electrodes are placed on the skin over three major muscle groups in each leg, with low-voltage electrical impulses inducing muscle contractions that may mimic mild exercise. Three patients at The Johns Hopkins Hospital have used the electrical pads for half-hour, twice daily exercise sessions as part of the devices' clinical testing. Needham says the team is still tracking recovery times, but he notes that studies in patients who were not critically ill have demonstrated that the technique keeps muscles from weakening.

For the walks, patients remain connected to their ventilators, heart monitors, and other equipment while using a standard walker. A nurse and physical and respiratory therapists accompany and monitor the

patient, stopping for rest periods as needed. Walking sessions, including rest breaks, usually last half an hour.

The team has also developed, with help from Johns Hopkins biomedical engineering students, a special walker called the "MOVER Aid," with a built-in seat for patients who need to sit and rest. The MOVER includes a wheeled pole to hold a ventilator and ICU monitoring equipment.

The motorized stationary bicycle affixed to the ICU bed has also been used by over a dozen patients at Hopkins, some sedated and others wide awake. Patients peddle for as much as 20 minutes per day.

Researchers in Europe, where the cycle ergometry device is made, recently compared a group of over 30 ICU patients who used the cycle to a similar number who did not and found that at discharge from the hospital, trained patients had stronger leg muscles and more were able to walk on their own.

According to critical care expert Eddy Fan, M.D., an instructor at Hopkins who collaborates on research with Needham, the long-term complications from stays in the ICU have only come to light as survival rates in critically ill patients have improved over the last 20 years. He says many more people are now surviving after being admitted with acute respiratory distress syndrome, one of the most severe medical conditions in need of critical care support.

"Bed rest often only compounds the problem and makes it worse," says Fan, who has had one patient lose as much as 60 pounds during an ICU stay of several weeks. "Many patients are already weak when they arrive in the ICU, having been sick for a while, and having dropped weight as a result of poor appetite. So they are often starting from a personal low point when they get here, and the lack of physical activity only hastens their decline.

"Early physical therapy is helping us to fix this problem," he adds. "It really is changing the way we practice critical care medicine in the ICU."

Since the introduction of early mobility practices in the ICU, Fan points out, average stays in Hopkins Hospital's medical intensive care unit have dropped by as much as two days (more than 20 percent.)

Furthermore, Fan says, efforts to reduce sedative use and its associated delirium are also proving effective. Delirium and its associated hallucinations are known to occur in ICU patients who have been heavily sedated, prolonging their recovery.

Needham says his team's next steps are to continue with long-term clinical tests of each technique, already under way at several U.S. hospitals, in which some critically ill patients are exercising heavily and others less so or not at all. The ultimate goal, the researchers say, is to determine if and by how much early mobility exercises improve quality of life.

Source: Johns Hopkins Medical Institutions