

Researchers hope to speed recovery of critically ill patients with bikes in their beds



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Physiotherapists Josée Lamontagne (left) and Rachel Goard supervised while Respiratory Therapy student Patrick Lapointe demonstrated the specially-designed bicycle at the Ottawa General Campus ICU.

COURTESY OF THE OTTAWA HOSPITAL

An experiment in the intensive care unit of The Ottawa Hospital aims to test whether critically ill patients can get back on their feet faster by cycling in bed.

As part of the randomized clinical trial, some ICU patients will get back on the bike, quite literally, within a week of admission.

Researchers hope that by exercising on a specially designed bed bicycle, patients will be able to speed their recoveries and avoid the severe muscle weakness that can result from prolonged bed rest.

Muscles can atrophy rapidly when they're not used: Research shows (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3726090/>) that healthy people lose four to five per cent of their muscle strength for each week of inactivity. Muscle loss tends to be most dramatic in the first 10 days, and can be exacerbated by mechanical ventilators. About 25 per cent of people who are on a breathing machine for a week or more will suffer from what's known as intensive care unit-acquired weakness (http://www.atsjournals.org/doi/abs/10.1164/rccm.201411-2011ST?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dpubmed&#readcube-pdf) — a debilitating condition that can take years to overcome.

“More and more critical care units are starting to push for early activity, early mobilization, to combat the detrimental effects of being in bed,” said Ottawa Hospital physiotherapist Rachel Goard.

The Ottawa Hospital is one of seven medical centres taking part in the CYCLE clinical trial, which is being led by McMaster University's Dr. Michelle Kho, who holds a Canada Research Chair in critical care rehabilitation and knowledge translation. A total of 60 patients are expected to be enrolled across the province.

Other clinical studies have established the value of conventional physical therapy, such as stretching, sitting, standing, walking and light exercise, for ICU patients. Kho's study will be the largest of its

kind to examine the benefits of in-bed cycling during a critical care stay.



The bicycle's screen shows the patient's speed and progress, and a cycling avatar keeps patients motivated. (Courtesy of The Ottawa Hospital) *COURTESY OF THE OTTAWA HOSPITAL*

As part of the two-year clinical trial (<https://clinicaltrials.gov/ct2/show/NCT01706978?term=ottawa&rank=50>), eligible ICU patients will be given 30 minutes a day of in-bed cycling using the RT300 (<http://www.restorative-therapies.com/my-friend-or-loved-one-is-in-critical-care>) supine bike — it can be rolled up to a patient's bed — in addition to routine physiotherapy.

Researchers will track the patients and compare their physical abilities upon discharge to those ICU patients who receive only routine physiotherapy. Patients' muscle strength will be assessed, along with their ability to stand and walk.

The investigators want to understand whether daily cycling is a feasible activity for patients early in their ICU stay, and ultimately, whether it takes them further down the road to recovery.

It's not clear whether cycling is a viable activity since ICU patients are critically ill: many are in some measure of pain, and it is common for those on mechanical ventilators to be deeply sedated. What's more, ICU patients often suffer from other challenges such as delirium, obesity and irregularities in heart rhythm and blood pressure.

A 2012 systematic review, conducted by researchers at Johns Hopkins University School of Medicine, found "growing evidence" to support the idea that critically ill ICU patients benefit from early physiotherapy and exercise. That study concluded that the practice is safe.

The researchers also called for more long-term studies, including an analysis of the benefits of additional measures, such as in-bed cycles and "tilt tables" that help patients get used to standing again.

The demand for ICU services is expected to increase by about 40 per cent during the next decade as the population ages. It means that lessening the physical toll of intensive care medicine will both improve lives and reduce health care costs since severely weakened patients tend to spend more time in hospital.

At The Ottawa Hospital, Goard said, the critical care unit is developing a new protocol to ensure that even sedated patients receive some form of physical activity. The bed bike is ideal for those patients, she said, since it has a motor that can help them move the pedals even when they're not awake.

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