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# In-bed cycling holds promise for critically ill patients' recovery

Can ICU patients avoid the muscle loss that limits mobility for years? Recent study of promising technology produces encouraging results.

February 16, 2017

It is a given that only the most seriously ill patients are admitted to an intensive care unit. Their fragile state of health (either from critical illness or severe injuries), the effects of various medication, plus long periods of immobility, can lead to Intensive Care Unit-acquired Weakness (ICUAW). A common problem in ICUs, especially for patients requiring mechanical ventilation, ICUAW consists of loss of muscle size and strength in the limbs and in those associated with breathing. Currently, there are limited treatment interventions available to prevent this serious complication.

Conventional wisdom dictates that the earlier patients in ICU receive physical therapy, the better their health outcomes are, as muscle loss begins quickly, usually within days of their admission to the ICU, and the reduction in mobility (especially in the legs) due to muscle atrophy and weakness can linger for up to five years.

- 55% of patients who stayed in the ICU for more than 8 days developed ICUAW.
- ICUAW is associated with a longer need for mechanical ventilation, as well as extended ICU and hospital stays.
- In-hospital costs per weak patient increased by 30.5%.

Source: [European Society of Intensive Care Medicine](#)



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A team of CIHR-funded researchers led by Dr. Michelle Kho from McMaster University, studied ICU patients at St. Joseph's Healthcare Hamilton. Rising to the multiple challenges posed by an ICU's physical environment, including working with patients who are hooked-up to multiple pieces of medical equipment, Dr. Kho designed the **Critical care cYCling to improve Lower Extremity strength** (or CYCLE for short) research



Dr. Michelle Kho, Assistant professor with the School of Rehabilitation Science at McMaster University and physiotherapist at St. Joseph's Healthcare Hamilton, monitors the in-bed cycling session using one type of critical care cycle ergometer, the RT-300 supine.

Photo courtesy of Marta Hewson Photography

program to study physical rehabilitation in ICU patients at a very early stage in their recovery.

The first study, TryCYCLE, proved that the concept was not only viable, it was also very doable.

In fact, TryCYCLE clearly demonstrated that ICU physiotherapists are able to safely start in-bed cycling sessions with critically ill; mechanically ventilated patients, very early on in their ICU stay.

“People may think that ICU patients are too sick for physical activity, but we know that if patients start in-bed cycling two weeks into their ICU stay, they will walk farther at hospital discharge.”

- Dr. Michelle Kho

TryCYCLE was the first in a series of studies created to systematically gather evidence-based data on the effects of early in-bed cycling on critically ill patients and to assess the benefits of early mobility.

A year-long study, TryCYCLE was conducted in the ICU at Hamilton's St. Joseph's Healthcare Centre. The treatment targeted the legs, especially the hip flexors, which are known to be the most vulnerable to the effects of bed rest.

Conducted six days a week, the treatment consisted of 30 minutes of cycling using specialized in-bed cycling equipment provided by St. Joseph's Healthcare Foundation. Patients cycled about 9 km on average during their ICU stay.

These results exceeded all expectations.

The researchers found that it was safe and feasible to conduct early cycling (within the first three days of admission to an ICU) with patients receiving mechanical ventilation; it could go a long way to strengthening muscles and improving overall health, but we still need to compare cycling to the typical types of therapy patients receive in the ICU.

If early in-bed cycling is successful, patients could go home sooner and enjoy a better of quality of life. Results from the CYCLE research program could also lead to shorter stays in the ICU which could help to alleviate the high cost of critical care.

“Our TryCYCLE study builds on previous work and finds that it is safe and feasible to systematically start in-bed cycling within the first four days of mechanical ventilation and continue throughout a patient’s ICU stay.”

- Dr. Michelle Kho.

Not content to rest on her laurels, Dr. Kho is already looking to the future, convinced that more research is needed to determine exactly how the CYCLE program helps to preserve precious muscle strength and improve her patients’ physical functioning. CIHR-funding will allow her to continue her work in the CYCLE Pilot randomized clinical trial.

“The next step is to have several hospital ICUs start the in-bed cycling study in a pilot randomized trial.”

- Dr. Michelle Kho

Critically ill patients in intensive care units (ICU) face an uphill battle as they set out on their journey to recovery. The findings of Dr. Kho’s TryCYCLE study clearly demonstrate that patients and their substitute decision makers were very open to participating in the study, their satisfaction with the results were overwhelming and many voiced the same sentiment: The sense of hope that the TryCYCLE program provided them was priceless.

## Associated links

- [Dr. Michelle Kho](#)
- [McMaster University](#)
- [St. Joseph’s Healthcare Centre](#)
- [CYCLE Trial](#)
- [2016 E-cycle: Clinical Trial Webinar with Dr. Michelle Kho](#)

### Date modified:

2017-02-10