

## Collocating a Critical Mass of Researchers Leads to Path-Breaking Innovations

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### MICHIGAN CENTER FOR INTEGRATIVE RESEARCH IN CRITICAL CARE

In May 2013, NCRC welcomed the Michigan Center for Integrative Research in Critical Care (MCIRCC), a new center for the study of acute illnesses and injuries. One of the world's first comprehensive research enterprises devoted to improving the care of victims of critical illness and injury, MCIRCC is a multidisciplinary center that catalyzes the translation of scientific discovery to multiple platforms of critical care across all patient populations. The "Virtual Center" is a hub for researchers at the forefront of their disciplines, representing several University of Michigan schools and departments—basic scientists, engineers, clinical investigators, inventors, and entrepreneurs, all focused on innovative critical care.

From the critically ill baby born prematurely, to the soldier critically wounded on the battlefield, patients from every conceivable demographic populate intensive care units in every town and city across the country. Overall, critical care accounts for almost 40% of total annual hospital cost. Nationally, the financial burden of critical illness and injury may exceed 270 billion dollars annually. In comparison, the annual financial burden for cancer is 160 billion dollars.

Death and disability from critical illness and injury account for more productive years of life lost than cancer and heart disease combined. Despite this, innovation in care and technology to improve outcomes across the spectrum of critical care is sorely lacking. With an aging population, an epidemic of chronic diseases like diabetes and heart failure, an increasing incidence of antibiotic-resistant bacteria, and hospital overcrowding, challenges in the care of the critically ill and injured will only be magnified.

Diagnosing and treating patients with acute illness or injury requires rapid, time sensitive diagnostics as well as sophisticated, labor-intensive treatments across many points of care, from the ambulance to the Emergency Room, ICU, Hospital Surgical suite, rehabilitation, and ultimately, back home. The critically ill or injured patient represents perhaps the greatest daily care challenge in medicine. Whether a victim of trauma or burns, an overwhelming infection, or cardiac arrest from a heart attack, critical illness and injury can strike at any time and in any population.

Today, every patient represents a disparate assortment of data and care touch points that are rarely consolidated into a personalized portfolio allowing critical care teams the ability to provide the right care at the right time to maximize impact. MCIRCC is creating a precise, predictive, proactive, and personalized solution to this challenge that uniquely integrates the

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entire critical care ecosystem from start to finish. The result: Revolutionizing how critical care is and will be provided.

[pullquote align="left"]The ability to rapidly and decisively integrate huge amounts of complex data from numerous sources and processes—the critical care “ecosystem”—can mean the difference between life and death, as well as the quality of life if a patient survives. [/pullquote]“The challenges of providing life-saving care to our most critically injured patients with the goal of returning them to their pre-injury state will require solutions that seem almost science fiction,” said MCIRCC’s first director, Dr. Kevin Ward, MD, Professor of Emergency Medicine. “The only way to do this is to develop the scientific teams of the future, and this requires engaging experts in many diverse fields.”

Collaborating with a diverse array of partners in academia, industry, and non-profits, MCIRCC’s unique integrated team of basic clinical, engineering, and information science researchers are aggressively tackling critical care in entirely novel ways. Combined, their work drives diverse scientific disciplines such as biomedical engineering, regenerative medicine, materials science, computational medicine, systems biology and others across the spectrum of critical care to create the next generation of therapeutics, diagnostics, devices, health information and care models to patients.

MCIRCC is strategically leveraging its location in Building 10 at the NCRC to collaborate with other key partners and faculty who are also members of new centers, departments and institutes such as the Biointerfaces Institutes, the Institute of Health Policy and Innovation, the Department of Computational Medicine and Bioinformatics, the Department of Integrative Physiology, and the Cardiovascular Center. Many of MCIRCC’s faculty members are also involved with these other efforts, collocation allowing for greater translation of scientific discoveries into critical care solutions.

“MCIRCC puts in place at the University of Michigan a new center that has the vision and direction to address and study critical care ‘emergency’ issues that often threatens life in a very rapid fashion, to saving lives through modern research and education,” says John Carethers, MD, Chair of the Department of Internal Medicine. “The multidisciplinary team approach with investigators working together in a coordinated fashion should on a continuous basis prevent premature death due to trauma or rapid medical decompensation. The Department of Internal Medicine and interested faculty are proud to be a component of this important endeavor for the University and the people of the State of Michigan.”

The NCRC location’s “Catalyst Core” will provide concierge services for MCIRCC members, to accelerate the development and commercialization of high impact clinical products based on MCIRCC research. Along the first floor corridor will be the Biosignal/Image Computational Core, as well as the Critical Care Ideation Hub, where business and MCIRCC members will come together to design and test new products. NCRC also houses MCIRCC’s other new team science support cores like the Advanced Coagulation Science Core and the Experimental ICU Core.

From new monitors that noninvasively detect hemorrhage and infection, to therapies that help heal the injured brain, lungs, and wounds, to care models and tools that help improve the quality of life after a critical illness and injury, MCIRCC is exploding with innovation designed to fast-forward from insight to patient impact. The right care at the right time: only unique team science can accomplish this.

