



# Research

## EMERGENCY MEDICINE

*The Future of Emergency Care*

Emergency Medicine (EM) focuses on life-threatening injuries and illnesses for which rapid detection, decision making, and treatment are necessary—traumatic injury and sudden cardiac death, as well as in-hospital acute problems such as sepsis, hospital-acquired infections and acute organ failure.

EM also serves as an access point and safety net for the health care system.

The EM space at NCRC gives basic scientists, clinical investigators, inventors, and entrepreneurs across the university a scientific home. EM supports integrated, pioneering research into the creation of emergency care systems that both respond to the complexity of emergency care, and engage both patients and health systems to provide solutions to the growing need for emergency medicine, from prevention to acute care. EM also has a strong interest in injury prevention—an effective means to maintain the health of our patients.

Earlier this year, the University of Michigan Injury Center moved its operations to NCRC from Domino's Farms. This group, focused on injury prevention research and engaging a cross-disciplinary approach to a major public health issue, is led by Dr. Rebecca Cunningham in Emergency Medicine, and funded jointly by various U-M departments and the Centers for Disease Control & Prevention as one of the 10 injury centers in the nation focused on prevention of injuries. With faculty members across multiple departments in the Medical School, the School of Public Health, and UMTRI, three fellows, and several interns and GSRAAs, the group focuses on research, education, and translation of prevention topics as violence, prescription drug misuse, motor vehicle crash, concussion, and suicide prevention.

Last year, the Michigan Center for Integrative Research in Critical Care (MCIRCC) moved its dry research and administrative space into Building 10. There are now six Principal Investigators (PIs) in the basic science component of EM, an additional PI within IHPI, and six more anticipate moving in as part of the Injury Research Center. Kayvan Najarian, PhD, was recruited last year to head

MCIRCC's Bioinformatics Signal and Image Analysis Core. Scott Van Epps, MD, PhD, whose interest is in bacterial contamination of medical devices and the development of infection resistant vascular devices also joined the lab.

2013 also saw the relocation of basic science laboratories from BSRB, the University of Pennsylvania, and Virginia Commonwealth University into NCRC. New work spurred by the co-location has focused largely on the development of a new technology for rapid identification of cells and bacteria. A utility patent for this application was submitted last year, and EM has secured over \$175,000 from both the Coulter Foundation and the Michigan Initiative for Innovation and Entrepreneurship. The program is currently exploring the feasibility of a biotech start-up with the Washtenaw County Incubator Collaborative, a state-funded collaboration between Ann Arbor SPARK, the MC3 Business Accelerator, and the Michigan Research Institute.

The move to NCRC has made the basic and translation laboratories in Emergency Medicine at Michigan the largest and most established in the country. With these latest moves, nearly all EM research infrastructure is located at NCRC.

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# Research

UNIVERSITY OF MICHIGAN INJURY CENTER

*Actionable Research to Reduce Injury in the Region*

The University of Michigan Injury Center, which relocated to NCRC in February 2014, focuses on preventing injury through research, education, and outreach. The Center believes that most injuries are preventable. Producing and disseminating quality, actionable research is at the core of the Center's mission; applying a public health approach, they work to reduce injury in the region and serve as a national resource.

The Injury Center is led by Dr. Rebecca Cunningham, who also serves as Associate Chair for Research in Emergency Medicine. As one of 11 Injury Control Research Centers funded by the Centers for Disease Control and Prevention, the Center aims to reduce injury by:

- Addressing the most pressing injury issues with innovation, passion, and a multidisciplinary approach
- Conducting relevant, impactful injury research
- Translating research into practice by developing effective interventions and disseminating actionable findings
- Training future injury researchers and practitioners
- Providing educational support and experiences for current and future injury professionals
- Publishing educational materials for practitioners
- Providing evidence-based information for developing injury policy

With participation from nearly 200 members from more than 20 institutions, and faculty leadership from more than 14 departments at three academic institutions, including Michigan State University, Wayne State University, and the University of Michigan, the Injury Center's members and leadership possess broad expertise and experience. Multidisciplinary collaboration is a hallmark of the Center's culture, and they encourage cross-disciplinary work to advance the field.

The Injury Center brings particular strength to the injury topics of:

- Unintentional Injury
- Prevention
- Motor Vehicle Crashes
- Prescription Drug Misuse
- Substance Abuse
- Concussions
- Falls
- Intentional Injury Prevention
- Youth Violence
- Child Maltreatment
- Sexual Violence
- Intimate Partner Violence
- Suicidal Behavior

The Injury Center provides strong support for injury researchers with annual pilot study funding opportunities to explore new paths of inquiry and discovery. In the past four years, they've funded 18 pilot studies—many of which have yielded promising results, and blossomed into larger funded studies.

Four innovative projects are currently underway:

- Amy Bohnert  
Development of a prescription drug overdose intervention, complete 2014
- C. Raymond Bingham  
Development of a parent guide for supervising teen drivers, complete 2015
- Maureen Walton  
Translation of a youth violence intervention in emergency rooms, complete 2017
- Patrick Carter  
Graduated drivers licensing policy evaluation, complete 2017



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The Injury Center also immerses trainees in injury work through internships for graduate students with community partners, academic departments, or at the CDC's National Center for Injury Prevention and Control in Atlanta, as well as Graduate Student Research Assistantships, which provide opportunities to explore research interests in injury prevention. In addition, the Center offers post-doctoral fellowships that engage recent PhDs in meaningful research, launching careers in injury prevention. Past and current fellows' research has included Lauren Whiteside's work in dating violence interventions, Patrick Carter's in transportation safety, Elizabeth Austic's in prescription drug misuse, and Quyen Ngo-Epstein and Yasamin Kusunoki's joint research on intimate partner violence.

Training events offered by the Injury Center suit various interests and expertise levels:

- Monthly lunchtime seminars featuring local speakers sharing recent or ongoing injury research;
- Quarterly distinguished faculty seminars bringing national and international experts to campus for unique educational opportunities;
- Workshops on statistical methodology, developing policy briefs, and other emerging topics;
- An annual research symposium, designed to give trainees experience presenting their work, while also learning new skills from expert speakers;

If injury prevention and control are of interest to you, consider becoming a member at

[www.injurycenter.umich.edu/about-center/apply-membership](http://www.injurycenter.umich.edu/about-center/apply-membership)

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# Research

## U-M CENTER FOR INTEGRATIVE RESEARCH IN CRITICAL CARE

A One-Stop Shop for Discovery, Innovation and Commercialization Guidance



Launched in May 2013 at NCRC, the U-M Center for Integrative Research in Critical Care (MCIRCC) is one of the first comprehensive research enterprises devoted to transforming critical care medicine to improve patient outcomes, enhance the clinician experience, and reduce healthcare costs.

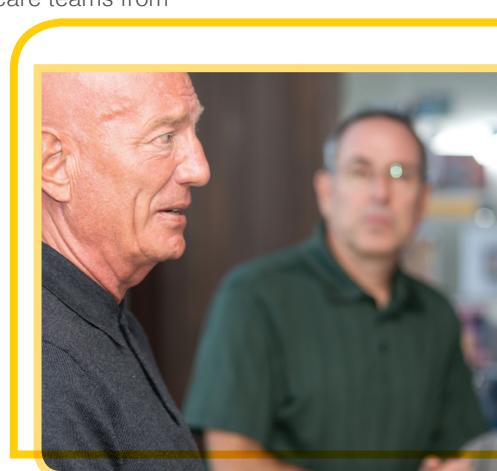
Critical illness and injury can strike anyone, at anytime, anywhere. Premature babies, high school athletes, battlefield soldiers, nursing home residents—patients from every conceivable demographic find themselves in critical care units. More often than not, diagnosis and treatment are extremely time-sensitive, and mere minutes can significantly affect outcomes.

Critical care costs the US over \$260 billion annually and accounts for nearly 40 percent of total hospital costs. Trauma remains the leading cause of death for Americans ages one to 44—more than cancer, more than heart disease. An aging population, an epidemic of chronic diseases such as diabetes and heart failure, an increasing incidence of antibiotic resistant bacteria, and overcrowding of hospitals will continue to challenge the delivery of care to our most critical patients. Yet innovations to improve outcomes across the spectrum of critical care are still sorely lacking. Teams rely heavily on protocol-driven treatment as opposed to personalized and evidence-based medicine, while devices, diagnostics, and vital signs have essentially remained unchanged for over 50 years.

In today's digital world, every patient represents a growing, increasingly disparate assortment of care touchpoints and health data from monitors, ventilators, lab results, image scans and more. But emergency rooms and intensive care units, as well as in-patient and out-patient facilities, do not have the infrastructure to consolidate and share this health information at the most crucial times, prohibiting critical care teams from providing the right care at the right time to maximize impact.

An integrated and comprehensive approach to critical care science, similar to approaches to cancer is long overdue. As a member-based organization, MCIRCC is the critical care hub that integrates academic scientists, clinical researchers, engineers, early-stage entrepreneurs, and industry partners to create multidisciplinary teams of the future. A one-stop shop for discovery, innovation and commercialization guidance, MCIRCC's platform combines new funding streams with new ways for research teams to work together, to accelerate translational research from the laboratory bench to the patient's bedside.

With this approach MCIRCC is aggressively tackling critical care in entirely novel ways, breaking new ground across the spectrum of care to the next generation of therapeutics, diagnostics, devices, health information and patient care models.



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## U-M CENTER FOR INTEGRATIVE RESEARCH IN CRITICAL CARE

A One-Stop Shop for Discovery, Innovation and Commercialization Guidance

### MCIRCC KEYS TO FUNDAMENTAL INNOVATION

Talent: World-class multidisciplinary research teams backed by innovation, financial, business and commercialization experts.

Integration: Highly coordinated and collaborative infrastructure that provides strong, sustained links between clinicians, scientists and engineers alongside early integration strategies with industry, entrepreneurs and donors to explore, develop and deploy critical care solutions, together.

Funding: Proven organizational structure and programs that support and accelerate the impact of translational research and new product development by deploying new revenue streams from intellectual property, grants, donors, industry and foundations.

Pipeline: Translational research is prioritized to ensure that new ideas are constantly flowing into the product development pipeline—resulting in novel therapeutics, diagnostics, devices, health information, and patient care models for hospital to home transitions.

Commercialization Roadmaps: Delivering comprehensive project packages that translate innovations from laboratory bench, to commercial industry, to the patient bedside or home in the shortest possible timeframe for maximum impact and success.

Metrics: Measuring success based on products delivered to market that are precise, predictive, proactive, personalized, and optimized for hospital to home transitions for real world impact at reduced costs.

"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 Executive Director, Kevin Ward, MD, Professor of Emergency Medicine. "The only way to do this is to develop scientific teams of the future, and this requires engaging experts in many diverse fields."

MCIRCC believes the collaborative and symbiotic research environment at the NCRC strongly positions U-M to bring university-led critical care innovations to market. From its location in Building 10, MCIRCC is able to effectively reduce collaborative barriers by closing geographic divides with other key partners such as the Fast Forward Medical Innovation, the Office of Technology Transfer, Michigan Center for Clinical and Health Research (MICHR), Institute for Healthcare Policy and Innovation (IHPI), Injury Center, Biointerfaces Institute, and the Center for Advanced Models for Translational Sciences and Therapeutics (CAMTraST) to name a few.

Through the co-location strategy, NCRC has established the research framework—the incubators for fundamental innovation—for university-led translational research. "Many of our faculty members have overlapping interests with these other efforts," stated Janene Centurione, MCIRCC's managing director. "The benefits of co-location have strengthened our relationships with these organizations to further catalyze the translation of scientific discoveries into high-impact critical care solutions."

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Since MCIRCC's founding launch key milestones and accomplishments further enhanced by the research environment at the NCRC location have included:

- Formation of the Catalyst Team, comprised of MCIRCC operational staff and representatives from the Office of Technology Transfer and Fast Forward Medical Innovation, to facilitate fast contracting and rapid product iteration.
- Master Collaboration Agreement with NovoDynamics, a company known for pattern recognition and predictive analytics solutions, for the development and commercialization of clinical decision support imaging solutions for traumatic injuries.
- Final negotiations with IBM and AirStrip for products targeting clinical decision support systems for critical care.

Hosting the first annual Critical Care Grand Challenge symposium and funding program to support milestone-driven sepsis research, with nearly 50 members in attendance. 14 proposals were submitted, and in July, MCIRCC announced funding awards to accelerate six innovative sepsis solutions for potential commercialization.

Completion of the MCIRCC Ideation Lab, a collaborative design space to inspire, enhance and cultivate imagination, creativity, and innovation in team science, located in NCRC Building 10.

MCIRCC measures success based on products delivered to market that are precise, predictive, proactive, personalized and optimized for hospital to home transitions, for real-world impact. Yes, research papers and grants are notable and necessary, but a new innovative solution at the patient is beside, or in the home has the power to save a life, elevate delivery of care, improve quality of life or to predict and avoid a critical health event altogether. And that's transformational medicine everyone can get behind—patients, families, clinicians, providers, payers and industry alike.