



EXPANDING OUR REACH



The Gillian Reny
STEPPING STRONG
Center for Trauma Innovation

Annual Stewardship Report: 2019–2020

BRIGHAM HEALTH
 BRIGHAM AND
WOMEN'S HOSPITAL

**Life. Giving.
Breakthroughs.**

BRIGHAM HEALTH



The Gillian Reny

STEPPING STRONG

Center for Trauma Innovation

The mission of The Gillian Reny Stepping Strong Center for Trauma Innovation is to catalyze multidisciplinary collaborations that inspire groundbreaking innovation, effective prevention, and compassionate intervention to transform care for civilians and military heroes who endure traumatic injuries and events.

Cover: In 2018, after five ankle breaks, James McClelland underwent the Ewing Amputation to remove his right leg below the knee. The procedure was developed and performed by Matthew J. Carty, MD, a Stepping Strong Innovator Award winner and the Stepping Strong Center director of strategy and innovation. James says the procedure has given him his life back, and he has returned to his active lifestyle, including ice climbing.

Photo courtesy of Marina Brock, New London, New Hampshire

PERSPECTIVES FROM LEADERSHIP



"For six years now, The Gillian Reny Stepping Strong Center for Trauma Innovation has been a point of pride for the Brigham. **I have witnessed the Reny and Epstein families show remarkable resilience** in the wake of the Boston Marathon bombings and inspire the creation of a center that is transforming trauma research."

Betsy Nabel, MD, Brigham and Women's Hospital President

"In 2014, the Stepping Strong Center honored me as the inaugural recipient of the Stepping Strong Innovator Award. Not only did this funding allow my team to pursue a novel amputation procedure that is now also being used in the military, but **the Innovator Awards have become a sought-after funding source for researchers** who are dedicated to transforming trauma care for patients."

Matthew J. Carty, MD, Stepping Strong Center Director of Strategy and Innovation



"As the center enters its sixth year, I pause to reflect on **how far we have come with support from donors like you**. Stepping Strong Innovator Awards have been leveraged into larger federal funding, and a small group of family and friends has grown into a global community of physician-scientists,

runners, and philanthropists all working together in an enduring Boston Strong spirit of collaboration to transform trauma care."

Audrey Epstein Reny, Stepping Strong Center Co-founder and Advisory Board Chair



"I am proud to lead the Stepping Strong Center, including our new Stepping Strong Injury Prevention Program, which seeks to reduce the burden of traumatic injuries.

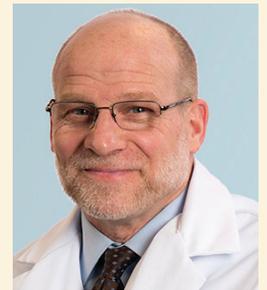
We have a unique opportunity to prevent injuries before they occur, thus expanding the role of the

hospital as a resource that extends far beyond our walls and into the community."

Ali Salim, MD, Stepping Strong Center Medical Co-director

"Too often, events take place such that civilians experience injuries similar to those sustained on the battlefield, including on the day of the Boston Marathon bombings. At the Stepping Strong Center, our ability to attract brilliant researchers from multiple institutions and think holistically about how we care for patients with traumatic injuries is helping us **transform how we respond in moments when every second counts.**"

Mitchel B. Harris, MD, Stepping Strong Center Medical Co-director



THE GILLIAN RENY STEPPING STRONG CENTER FOR TRAUMA INNOVATION

Traumatic injuries can affect anyone, regardless of race, ethnicity, economic status, or geographic region. Across the globe, one person succumbs to injuries sustained from trauma every three minutes. According to the Centers for Disease Control, trauma is the No. 1 cause of death for people 46 years of age and under. Injuries, including unintentional and violence-related injuries, account for 59% of all deaths among people 44 years of age and under. These account for more deaths than noncommunicable diseases and infectious diseases combined. Altogether, the cost from traumatic injuries is nearly \$7 billion a year.

In 2014, the Reny and Epstein families inspired the launch of The Gillian Reny Stepping Strong Center for Trauma Innovation to address traumatic injuries and honor the medical team that saved Gillian's life in the aftermath of the Boston Marathon bombings. Since that time, and thanks to the generous support of donors like you, the Stepping Strong Center has become a thriving multi-institutional, multidisciplinary research hub. The center provides physician-scientists with critical tools and resources to advance their work, educates the next generation of medical leaders in treating trauma patients, and empowers community members to serve as advocates and global ambassadors.

STEPPING STRONG CENTER FOCUS AREAS

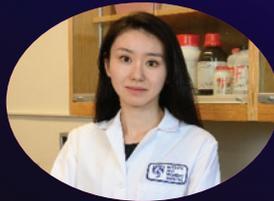
RESEARCH



Through Stepping Strong-funded programs such as the Innovator Awards, Research Scholars, and Breakthrough Awards, researchers are pursuing projects to transform outcomes for trauma patients.

Learn more on pages 3-6, 8-11

EDUCATION



The Stepping Strong education initiatives include a Trauma Fellowship, which trains medical leaders in acute and complex injury, and the Explorer Program, which expands young professionals' knowledge of the trauma field.

Learn more on page 7

INJURY PREVENTION



The Stepping Strong Injury Prevention Program aims to reduce traumatic injuries resulting from occurrences such as older adult falls, interpersonal violence, car accidents, and substance use.

Learn more on pages 12-13

COMMUNITY



True to the Boston Strong spirit of kindness and collaboration, members of the Stepping Strong community advance our cause by participating in road races, hosting fundraisers, and serving as ambassadors.

Learn more on pages 14-17

THE STEPPING STRONG INNOVATOR AWARDS

The Stepping Strong Innovator Awards inspire novel research that improves standards of care for civilian and military trauma patients. To date, the center has provided grants totaling \$3.8 million to 26 research teams for groundbreaking projects in two core areas:

TRAUMA INNOVATION. Projects aim to address clinical challenges in areas including bone, wound, and skin healing; limb transplant and reconstruction; bone and muscle regeneration; advanced stem cell technology; orthopaedic and plastic surgery; and bioengineering.

INJURY PREVENTION. The only way to fully eliminate the burden of injury is to prevent it. Innovators are pursuing best practices in emergency preparedness, hemorrhage control, and intimate partner violence.

The Stepping Strong Center's model—bestowing seed grants of \$100,000 or more to research teams that show great promise—has a proven track record. This model has resulted in **more than \$18 million in federal funding**, leading to better patient outcomes and the potential for commercialization.



2019 Stepping Strong Innovator Award winners

In November, the center hosted the Second Annual Stepping Strong Trauma Research and Innovation Symposium and announced the 2019 Stepping Strong Innovator Award winners. The symposium featured discussions among past winners and Medical Executive Committee members on collaborative approaches to early-stage discovery, strategies to propel innovative ideas from lab to market, and approaches for attracting venture capital. A keynote address was given by **Lt. Col. Benjamin Kyle Potter, MD**, director for surgery at Walter Reed National Military Medical Center. In addition to discussing his time deployed as an orthopaedic surgeon in support of Operation Enduring Freedom in Afghanistan, Dr. Potter shared news of a new partnership with **Matthew J. Carty, MD**, director of strategy and innovation at the center, in which wounded warriors will benefit from the Stepping Strong-funded Ewing Amputation.

2019 STEPPING STRONG INNOVATOR AWARDS

In 2019, the Stepping Strong Center received a record number of Innovator Award applications from physician-scientists representing institutions across the country. After rigorous review, center leadership, Stepping Strong Medical Executive Committee members, and Advisory Board members awarded five grants to talented researchers conducting novel trauma research at Brigham and Women's Hospital, Massachusetts General Hospital, the Harvard Stem Cell Institute, and Dartmouth-Hitchcock Medical Center.

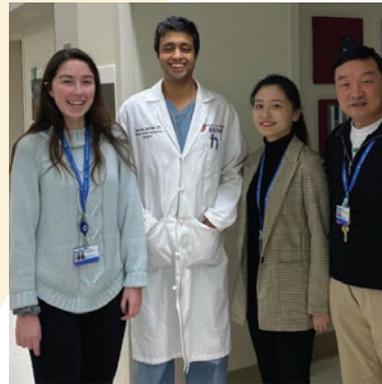
Making the Invisible Visible: Bringing Intimate Partner Violence into Focus



Intimate partner violence (IPV), defined as physical, sexual, or emotional violence between partners or former partners, is a prevalent public health issue. In the United States, one in four women and one in seven men have reported experiencing

severe physical violence from a partner in their lifetime, and half of female homicides between 2003 and 2014 were linked to IPV. Radiologists like **Bharti Khurana, MD**, director of Emergency Musculoskeletal Radiology, are in a unique position to objectively identify incidents of IPV based on specific radiological findings and patterns. Dr. Khurana will develop a multidimensional alert system that analyzes a patient's signs, symptoms, imaging findings, and history; classifies injuries for their likelihood of being a result of IPV; and automatically alerts physicians. In addition, Dr. Khurana's multidisciplinary team will generate guides for social workers and physicians with the goal of enhancing communication between caregivers and potential IPV victims.

Using Biologic Agents to Regenerate Muscles After Traumatic Injury



Traumatic heterotopic ossification (HO)—the formation of bone in soft tissue—is a significant barrier to patient recovery after a musculoskeletal injury.

Shailesh Agarwal, MD (second from left), a plastic and reconstructive surgeon

at the Brigham, found a protein that significantly reduces HO, but it is difficult and expensive to manufacture as a therapy and requires patients to receive repeated injections over a long period of time. To solve for this, Dr. Agarwal aims to create a technology that uses a patient's own fat tissue to express the protein. The existence of a cost-effective biologic drug would greatly improve healing for patients who suffer from musculoskeletal injury.

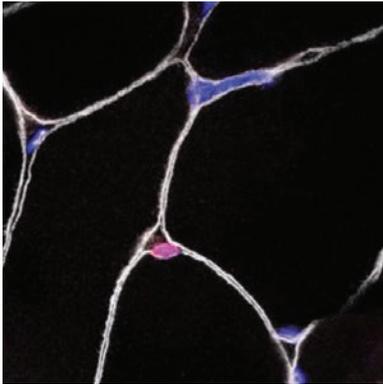
Improving Outcomes for Patients with Fracture-Related Infections



Infection following fracture is one of the most prevalent and challenging complications in trauma patients. Adequate blood flow is critical to deliver oxygen, nutrients, and antibiotics to the infected bone, so an infected bone with

poor blood flow needs to be surgically removed. Currently, however, there are no suitable methods for assessing bone viability. **I. Leah Gitajn, MD**, an orthopaedic surgeon at Dartmouth-Hitchcock Medical Center, aims to provide physicians with a method to do so by developing a technique to optimize and measure surgical removal of infected bone for fracture-related infections. This will result in better outcomes for patients and allow them to regain mobility more rapidly.

A Cell Therapy Platform for Treating Skeletal Muscle Trauma



Skeletal muscle has a remarkable capacity to regenerate due to a satellite stem cell that is responsible for post-natal muscle growth and regeneration. Despite this, sometimes injuries are so severe that volumetric muscle loss (VML) occurs, the

regenerative process is less efficient, and patients suffer permanent loss of movement and muscle function. **Feodor Price, PhD**, a research scientist at the Harvard Stem Cell Institute, knows that delivering satellite cells into damaged muscle would help treat VML, but these cells cannot be grown in the lab. Dr. Price discovered a method to successfully generate millions of cells that behave like satellite cells. These cells have the potential to regenerate muscle in trauma patients and help restore full range of motion.

A Novel Approach to Stimulating Bone Regeneration and Repairing Fractures



Poor fracture healing is a major problem for patients with large traumatic bone defects, but there currently are no FDA-approved therapies to address this. **Marc Wein, MD, PhD** (left), an endocrinologist at Massachusetts General Hospital, identified a new

oral drug that stimulates bone regeneration and promotes fracture healing. Dr. Wein will lead a multidisciplinary team of scientists with expertise in bone cell biology, skeletal biomechanics, orthopaedic surgery, single-cell genomics, and medicinal chemistry to test the effects of this drug. The team will also create a new version of the drug that is targeted directly to bone for enhanced recovery with reduced side effects. These studies will lay the groundwork for new therapies to improve treatment for trauma patients.



“I became a Brigham patient nearly 20 years ago and have long sought a way to give back to my amazing caregivers in the Division of Orthopaedic Trauma. I was born with a rare brittle bone condition, diagnosed as a toddler, and have broken more than 80 bones to date. When my husband, Greg, and I learned about the Stepping Strong Center, we immediately connected with the center’s collaborative approach to transforming trauma care and catalyzing innovative research for patients like me. It gives us great pleasure to have the opportunity to pay it forward by funding Dr. Wein’s Stepping Strong Innovator Award project.”

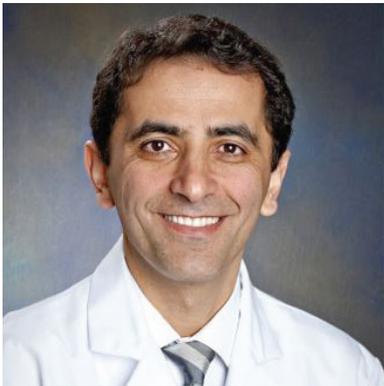
Tara Ciongoli, Stepping Strong Advisory Board member

STEPPING STRONG BREAKTHROUGH AWARDS

The Stepping Strong Center has granted Breakthrough Awards to six previous Innovator Award winners who have made notable scientific progress, providing them with additional financial support to advance their research to the next level. In addition to Stepping Strong Breakthrough Award winners Drs. Carty, Goralnick, and Sinha, who are profiled on pages 8-11, three other Breakthrough Award recipients are having a remarkable impact on trauma research and care.

Stepping Strong Center leadership works closely with all award winners to increase the pace and likelihood of success by providing strategic guidance, mentorship, access to the growing Stepping Strong Center network, and assistance promoting their work.

Reza Abdi, MD



Dr. Abdi developed an innovative and life-saving approach that uses skin allografts—tissue from a donor—to treat severe burn patients. Rejection of allografts is common, so Dr. Abdi’s team is using an immunomodulatory implantable gel that suppresses allograft

rejection, and they are microengineering off-the-shelf, ready-to-use, implantable scaffolds to increase the efficacy of the allografts in burn patients. This advanced technology will allow for rapid closure of wounds, which in turn will help shorten hospital stays and improve survival rates. Dr. Abdi is planning to apply for a National Institutes of Health grant using the data generated with support from the Stepping Strong Center.

Omid Farokhzad, MD

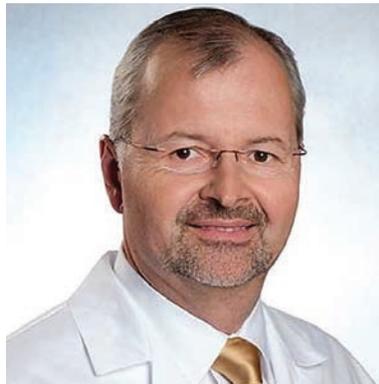


Dr. Farokhzad is focused on injuries from accidents and severe trauma that can cause large open bone fractures and, in more extreme cases, large bone defects. Such injuries are prone to poor bone healing and high rates of infection.

As a result, orthopaedic

trauma surgeons are often challenged to stabilize and repair bone injuries, while preventing infection and aiding bone healing. Dr. Farokhzad is addressing these challenges with small, biodegradable robots called nanodrones that can deliver antibiotics and other drugs to promote bone growth and wound healing in a more efficient way.

Bohdan Pomahac, MD

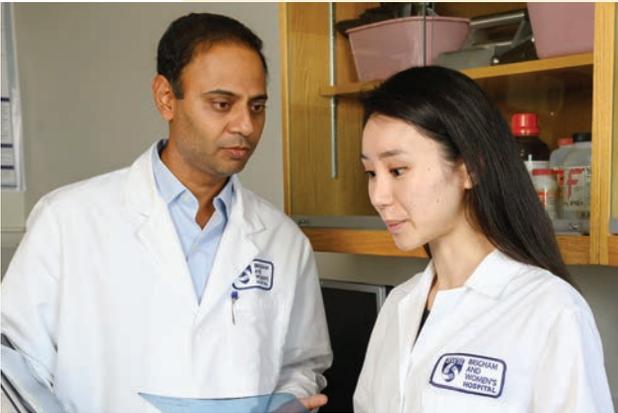


Dr. Pomahac developed an ultraportable device that expands the time in which an amputated limb can be safely reattached, from four to six hours to up to 24—a revolutionary development for wounded warriors and injured medical personnel faced with traumatic

injuries. The team is currently collaborating with engineers from Hydrix, a product development company, to build the device and bring it to market for use in the field.

STEPPING STRONG CENTER EDUCATION INITIATIVES

Stepping Strong Trauma Fellowship: A Conversation with Yori Endo, MD



Yori Endo, MD (right), is the 2019–2020 Stepping Strong Trauma Fellow under the mentorship of Stepping Strong Breakthrough Award winner Indranil Sinha, MD (left).

Congratulations on being named the 2019–2020 Stepping Strong Trauma Fellow! Tell us a little bit about yourself.

I was born in Japan and moved to England when I was 16 years old. I earned my medical degree at the University of Cambridge, as well as my master's degree in clinical research. I have a background in biomedical science and have always had a passion for conducting medical research.

Stepping Strong Explorer Program

Launched in 2019, the Stepping Strong Explorer Program funds young healthcare professionals to help them develop their knowledge, networks, and understanding of traumatic injuries, to promote interest in the field, and to build community. To date, the center has awarded four Explorer Program grants that support participation in medical, scientific, or technical conferences and other training opportunities that align with the Stepping Strong Center's mission.

How did you hear about the Stepping Strong Trauma Fellowship?

I heard Dr. Sinha present on his Stepping Strong Innovator Award project, and I liked how he combined his expertise in stem cell research with various technologies to develop a new scaffold for patients with muscle injuries. I believe that advances in science should positively impact patients, and in Dr. Sinha's lab, the knowledge obtained from research is directly applied to clinical issues. After joining the lab, the Stepping Strong Trauma Fellowship was a very natural next step because Dr. Sinha has been heavily involved in the Stepping Strong Center since its establishment. My fellowship reflects Dr. Sinha's continued endeavor to improve clinical care for trauma patients.

How will your time as the Stepping Strong Trauma Fellow help you achieve your career goals?

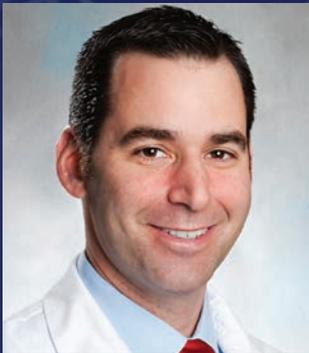
My goal is to lead a clinical project of my own. I have a strong interest in wound healing and skin diseases, and a newfound passion for trauma research. Being the Stepping Strong Trauma Fellow has given me a much clearer understanding of the patients being impacted by my work in the lab. I have had the opportunity to work with experts in the field and to grow as an independent researcher. It is an honor to be part of the Stepping Strong Center community.



Julie Burland, PhD, ATC, CSCS, a postdoctoral research fellow at the Brigham, received a Stepping Strong Explorer Program grant to help her attend the 2019 International Cartilage Regeneration and Joint Preservation Society (ICRS) Congress in Vancouver, BC.

This opportunity allowed Dr. Burland to gain further insight into the technological and research advancements for cartilage repair, regeneration, and preservation, which she hopes to apply to reducing disability after traumatic injury.

HOW TRAGEDY INSPIRED TRAUMA INNOVATION



Eric Goralnick, MD, MS



Matthew Carty, MD



Indranil Sinha, MD

On the day of the Boston Marathon bombings in 2013, **Eric Goralnick, MD, MS**, an emergency medicine physician and former naval officer, was the Brigham's medical director of emergency preparedness, responsible for training staff to care for survivors of mass casualty incidents. Within minutes of the two explosions at the finish line, Dr. Goralnick left the scene where he had been providing routine post-race medical care to the Brigham marathon team and returned to the hospital by ambulance to assume his role caring for the injured. Dr. Goralnick was part of a multidisciplinary team that initiated the hospital's mass casualty incident plan, resuscitated patients with life-saving medications, and triaged patients to operating rooms.

Forty patients, including Gillian Reny and her family, were treated in the Brigham emergency department that fateful day—the most of any Boston hospital. One surgeon on the receiving end of the triage performed by Dr. Goralnick was **Matthew J. Carty, MD**, director of the Lower Extremity Transplant Program. When the bombs went off, Dr. Carty was finishing up operating on the face of a young man who was involved in a motor vehicle accident a few days prior. When Dr. Carty got word of the bombings, he helped deploy plastic surgery staff to each of the operating rooms in which care to survivors was administered. In conjunction with members of the orthopaedic trauma, general trauma, and vascular surgery teams, Dr. Carty and his colleagues were able to provide true multidisciplinary care to 14 survivors who needed surgery that day.



Gillian Reny poses with Dr. Carty after he receives the inaugural Stepping Strong Innovator Award in 2014.



Dr. Carty meets with Army veteran and Ewing Amputation patient Brandon Korona before he undergoes surgery.

Across town at Massachusetts General Hospital, fourth-year plastic surgery resident **Indranil Sinha, MD**, was providing consults for survivors who came through the emergency department. All three physicians, playing very different roles in the wake of the bombings and at very different points in their careers, would go on to become important members of the Stepping Strong community that was born out of that day's tragedy.

A year later, the Stepping Strong Center was established, and Dr. Carty received the inaugural Stepping Strong Innovator Award for a project that sought to revolutionize lower extremity amputations, a procedure that many survivors of the Boston Marathon bombings have now undergone.

"Despite remarkable advances in the technology of modern-day prosthetics, little has changed in terms of how we perform amputations for patients whose legs cannot be salvaged," says Dr. Carty. "I wanted to change that and help patients recover normal limb function."

Just two years after receiving his initial funding, Dr. Carty received a second round of Stepping Strong Center funding that enabled him to perform the first clinical representation of his work. To date, Dr. Carty has performed what is now known as the Ewing Procedure, named in honor of his first patient,

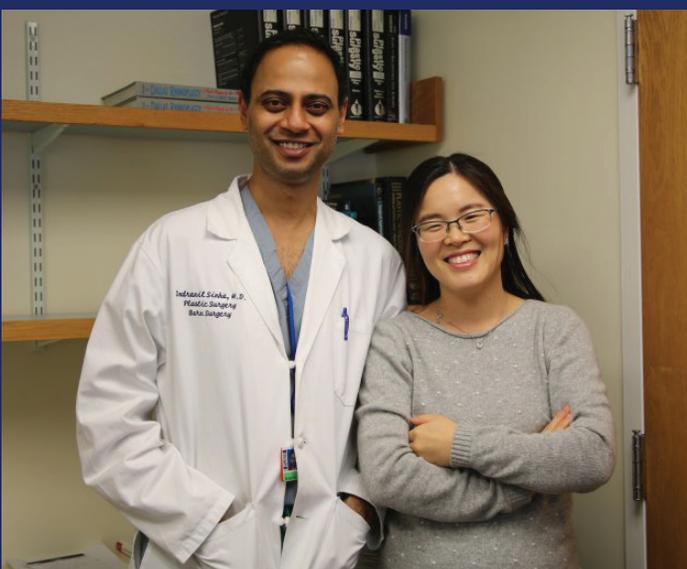
Jim Ewing, on more than 20 patients, including military veterans injured in combat, and the first double Ewing Amputation, with encouraging early results. Based on this work, Dr. Carty and his collaborators have received millions of dollars in additional outside funding, including a \$3 million Department of Defense grant to apply the procedure to upper limbs.

To date, Dr. Carty has performed the Ewing Amputation on more than 20 patients, including military veterans injured in combat, and the first double Ewing Amputation, with encouraging early results.

Dr. Sinha, who was hired as a Brigham plastic surgeon after completing his residency and working at the Harvard Stem Cell Institute, won a Stepping Strong Innovator Award in 2014. The award was the first grant of his career, in support of his project using stem cells to regenerate injured muscle. This work was funded by the Stepping Strong Center again in 2017, after Dr. Sinha joined forces with fellow Innovator

Award winner **Su-Ryon Shin, PhD**. Drs. Sinha and Shin are deepening their Stepping Strong Center collaboration by exploring skeletal muscle regeneration following volumetric muscle loss (VML) injuries. “Approximately 500,000 trauma patients suffer from VML injuries. We know that patients don’t recover well after VML because instead of the body healing and making more muscle, there is lots of scarring,” says Dr. Sinha. “But why? This is what the Stepping Strong grant helped us answer.”

Drs. Sinha and Shin found that signaling molecules are needed for these cells to grow, but they are absent following VML. Using a custom-built, handheld printer, they developed 3D-printed bio-scaffolds and successfully implanted them in animal models with VML injuries. Dr. Sinha credits the Stepping Strong Center with allowing him to generate the preliminary data necessary for additional funding. He has now received more than \$5 million in federal funding for this project.

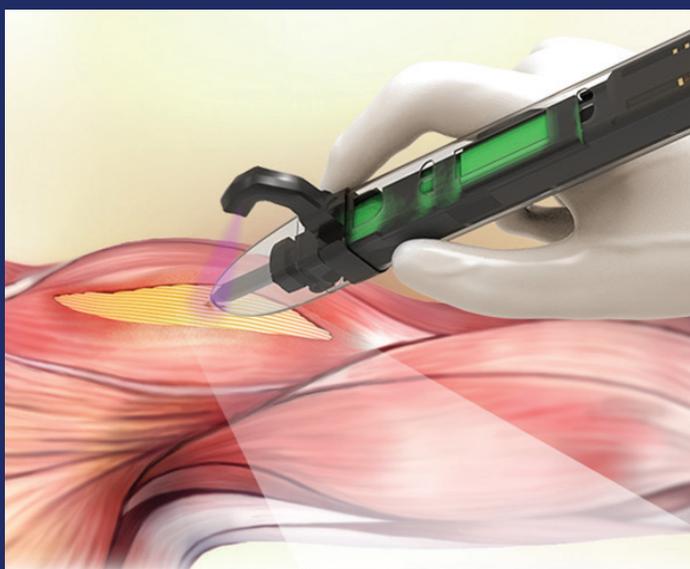


Drs. Sinha and Shin are exploring skeletal muscle regeneration following muscle loss injuries.

Dr. Goralnick and his colleagues received a Stepping Strong Innovator Award the following year to support their project to define best practices for preparation, mitigation, response, and recovery related to mass casualty incidents. Dr. Goralnick remains focused on prevention of traumatic injury, including his work with Stop the Bleed, a White House-sponsored national initiative based on military innovations that empowers bystanders to “be the help until help arrives” by recognizing life-threatening bleeding and applying

“The Stepping Strong Center has helped establish an environment in which collaboration can occur among people who otherwise would not have worked together, to help a population that might not otherwise receive care.”

—Indranil Sinha, MD



The 3D bioprinter allows surgeons to deposit materials to help support cellular and tissue growth directly into the defect sites within weakened skeletal muscles.



Brigham employees and members of the public learn about tourniquet application and bleeding control.



Dr. Goralnick presents on developing common standards for disaster medicine and empowering bystanders to respond during mass casualty incidents.

“The Stepping Strong Center's support is critical to my work. It has changed the direction of my career in such a positive way, to best serve our community.”

—Eric Goralnick, MD, MS

pressure or tourniquets to the injured. He and his team have trained more than 3,000 people, including staff at stadiums, convention centers, schools, and malls across New England.

Dr. Goralnick is currently working with Massachusetts State Rep. Shawn Dooley to advocate for the passage of the Trauma Preparedness Act, which would make it mandatory to have a trauma kit in all public buildings. He has published in a number of peer-reviewed journals, been featured in multiple national news outlets, and serves on committees for organizations such as the American Heart Association and the American College of Emergency Physicians. Dr. Goralnick is now broadening his efforts to include firearm injury prevention initiatives.

“The Stepping Strong Center's support is critical to my work,” says Dr. Goralnick. “It has changed the direction of my career in such a positive way, to best serve our community.”

Drs. Sinha and Carty feel similar gratitude to the Stepping Strong Center for including them on this journey to transform trauma care.

“It has been incredible to witness what a passionate family can do to impact the care of others,” says Dr. Sinha. “The Stepping Strong Center has helped establish an environment in which collaboration can occur among people who otherwise would not have worked together, to help a population that might not otherwise receive care.”

“The Stepping Strong Center was instrumental in getting the foundational work behind the Ewing Amputation off of the ground,” says Dr. Carty. “The Innovator Awards have made it possible for all of us to make incredible advances in treatments for trauma patients. Simply put, together we are saving lives.”

STEPPING STRONG INJURY PREVENTION PROGRAM



Dr. Salim (second from left) rounds with colleagues in the Brigham Emergency Department.

Recognizing that the only way to truly eliminate the burden of injury is to prevent injuries from ever occurring, the Stepping Strong Center is deeply committed to tackling this public health issue. To date, the center has focused on key topics including emergency preparedness, tourniquet training, and developing standards for disaster medicine. In an effort to make even more impact, under the direction of **Ali Salim, MD**,

the center will officially launch the Stepping Strong Injury Prevention Program in June 2020, becoming one of only a handful of programs across the country to offer this specialized focus. The program will bring together patient care and training experts from across the Brigham and Harvard Medical School to provide world-class expertise in medicine, surgery, social work, psychology, and patient advocacy.

The Stepping Strong Center is taking an “upstream” approach to injury prevention initiatives. Upstream interventions and strategies focus on improving fundamental social and economic structures in order to decrease barriers and improve supports that allow people to achieve their full health potential.



To help launch the program, the Stepping Strong Center recently hired **Molly Jarman, PhD, MPH**, as the Injury Prevention Program director. Dr. Jarman is an investigator at the Brigham's Center for Surgery and Public Health and an instructor in

surgery at Harvard Medical School. Her research addresses trauma surgery and emergency medical services, with a primary interest in trauma system organization, access to care for underserved populations, and development of methodologies in health services research. With training in both health behavior and health policy, Dr. Jarman believes multifaceted, interdisciplinary efforts are essential for preventing injuries.



Cheryl Lang, MPH, comes to the Stepping Strong Center from Boston Children's Hospital, where she focused on integrating poison prevention strategies into community public health initiatives. Ms. Lang received her Bachelor of Science

and Master of Public Health degrees at Boston University. In her new role as the Injury Prevention Program project manager, Ms. Lang will assist in developing the program, enhancing collaboration efforts among the Brigham's existing injury prevention initiatives, and establishing external partnerships.

The Stepping Strong Injury Prevention Program will work to identify solutions related to the following five areas:



Adult Falls

Among older adults, falls are the leading cause of injuries and hospital admissions for trauma. Falls can take a serious toll on quality of life and independence.

Injury-Related Outcomes

Patients who suffer major traumatic injuries experience a 20% mortality rate, and many survivors are left with permanent disability.



Interpersonal Violence Prevention

From infants to the elderly, violence affects people in all stages of life. Those who survive violence suffer physical, mental, and emotional health challenges.



Traffic Safety

Motor vehicle crashes, often due to distracted driving, are a leading cause of death in the U.S.



Substance Use

There are 19.7 million people in the U.S. battling substance use disorders, and more than 105,000 people die of alcohol and drug overdose each year.



RAISING FUNDS AND AWARENESS: STEPPING STRONG IN THE COMMUNITY

2019–2020 EVENTS



March 3: The New York Times publishes an article on Ewing Amputation patient Morgan Stickney

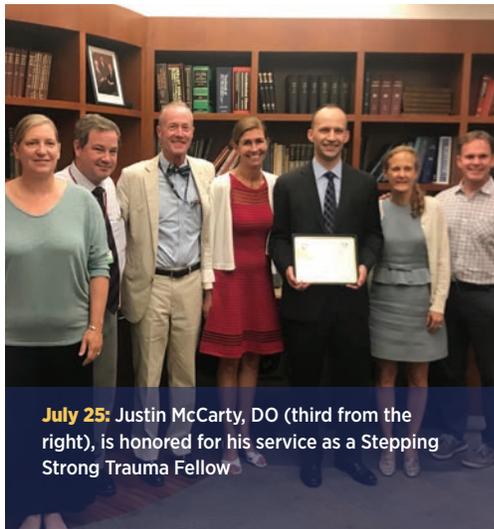


April 2: Ewing Amputation patient Tammy Jerome is honored as a “Hero Among Us” by the Boston Celtics at TD Garden

\$18M+
given to the
Stepping Strong Center
since 2014



June 26: Eataly Boston and Boston Celtics host “Pizza with the Pros” to benefit the Stepping Strong Center



July 25: Justin McCarty, DO (third from the right), is honored for his service as a Stepping Strong Trauma Fellow



August 18: 22 runners participate in the Falmouth Road Race and raise more than \$19,000 for the Stepping Strong Center



October 16: Stepping Strong Advisory Board members meet to discuss important center initiatives

30,638
gifts since 2014



October 27: Brigham patient Muji Karim, a football player who lost both of his legs and his left hand in a car accident, was the keynote speaker at the Stepping Strong trauma survivor dinner



April 13: More than 220 runners participate in the B.A.A. 5K and raise \$104,000 for the Stepping Strong Center



April 15: 140 runners participate in the 123rd Boston Marathon and raise \$1.5 million for the Stepping Strong Center



April 15: CBS Morning Show with Don Dahler highlights Stop the Bleed training with high school students



September: Members of the Stepping Strong community join TextLess Live More, a student-led advocacy group dedicated to ending distracted driving, to demand a hands-free bill in Massachusetts



September 2-January 15: The Stepping Strong Center hosts the Design Museum's Bespoke Bodies exhibit at the Brigham

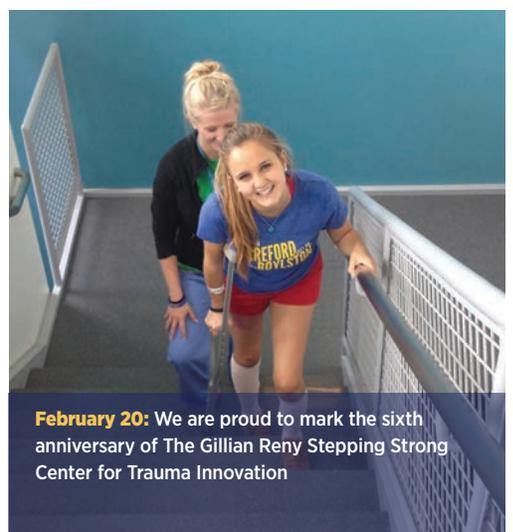
Since 2014
1,750
runners have raised
\$4M
to advance
trauma innovation



November 13: The Second Annual Stepping Strong Trauma Research and Innovation Symposium is hosted in the Hale Building for Transformative Medicine



December 12: STAT reports that the Ewing Amputation is being adapted for upper extremity amputations



February 20: We are proud to mark the sixth anniversary of The Gillian Reny Stepping Strong Center for Trauma Innovation

STEPPING STRONG RUNNING PROGRAM



2019 Stepping Strong Boston Marathon team

2019 Marathon Team Stats



143 runners

30 repeat runners



18 states

5 countries



25 BWH employees

Members of the Stepping Strong Center running program provide the center with the necessary funds to do much of the critical work detailed in this report. These runners are ambassadors who raise awareness and channel the Boston Strong spirit that defined the city and the running community in the wake of the 2013 Boston Marathon tragedy. In 2014, a small group of Gillian Reny's family, friends, and caregivers created the Stepping Strong Boston Marathon team and ran the race to honor her and launch fundraising for Stepping Strong Center initiatives. Six years later, the team has grown to 143 runners from 18 states and five countries.

The team includes first-time runners, repeat runners, and Brigham employees, all committed to training and fundraising for the center because of a personal connection to traumatic injury or a desire to change outcomes for patients around the world.

In addition to the Boston Marathon, Stepping Strong runners participate in the Boston Athletic Association's 5K and 10K races, the Falmouth Road Race, the Nantucket Triathlon, and marathons across the country and around the world.

SAFER at the Boston Marathon: Feasibility of an Injury Prevention Program



Rebecca Breslow, MD, is a primary care sports medicine physician at the Brigham, as well as the Stepping Strong running program's official team doctor. This past year, the

center provided Dr. Breslow with \$25,000 to focus on injury prevention for runners. Millions of people in the United States participate in long-distance road races every year, and some participants experience life-threatening medical problems during or after a race. Dr. Breslow's goal is to prevent race-day medical problems by identifying runners who are at high risk before they run a race. A similar program was launched in South Africa, and the country successfully lowered the rate of race-day medical problems by 29% and reduced serious medical problems by 64%.

With the support of the Stepping Strong Center, Dr. Breslow will review B.A.A. race-day medical encounter forms from 2017 to 2020 and analyze the data in collaboration with South African colleagues. Based on this data and lessons learned from similar injury prevention programs, Dr. Breslow will then lead the B.A.A. medical committee to update its medical practices and implement injury prevention protocols for the 2020 B.A.A. road races. If proved feasible and effective, the program will improve participant and community safety. It has the potential to impact policy and best practices for road race medical operations across the United States.

STEP UP FOR STEPPING STRONG



Audrey Reny Epstein, Dr. Salim, and Dr. Nabel are presented with a \$100,000 check from Cigna.

STEP UP FOR STEPPING STRONG

Now in its third year, Step Up for Stepping Strong is a corporate wellness program that encourages participants to stay active during a month-long, mobile app-based steps challenge. The steps challenge, which takes place in May, National Trauma Awareness Month, allows companies and individuals to raise awareness and funds for the Stepping Strong Center.

For the second year in a row, Cigna HealthCare, together with media partner WCVB, presented the Step Up for Stepping Strong Challenge and committed \$100,000 to the Stepping Strong Center if participants reached 300 million steps before the end of the month. Participants from 12 different countries took more than 90 million steps in the first week and surpassed the 300 million steps goal by the third week. This year's challenge was our biggest yet, with 52 local companies and 3,211 individuals taking a remarkable 616 million steps, or 254,000 miles.

In June, Cigna leadership presented the \$100,000 check to Brigham President Betsy Nabel, MD, Stepping Strong Center Medical Co-director Ali Salim, MD, and Stepping Strong Center co-founder Audrey Epstein Reny.



3,211

participants

616M

steps

52

companies

THANK YOU

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We acknowledge the generous donors who have cumulatively given \$25,000 or more to The Gillian Reny Stepping Strong Center for Trauma Innovation as of February 29, 2020.

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Thank you to the individuals, families, foundations, and organizations who have given \$1,000 or more between March 1, 2019, and February 29, 2020.

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We launched the Stepping Strong Center to honor the medical teams that saved Gillian in the aftermath of the 2013 Boston Marathon bombings and to support their efforts to improve outcomes for other trauma patients. We had no idea if anyone would join us, but six years later, it is so humbling to see the work of the center inspiring so many people. Physician-scientists from major academic medical institutions in Boston and beyond are collaborating on innovative trauma research; runners are conquering 26.2 miles on our behalf; donors from across the globe are advocating for and supporting us. The Stepping Strong Center's reach has expanded well beyond our family and Gillian's story. James McClelland (pictured on the cover) is an amputee who is ice climbing again; Morgan Stickney is a double amputee who is swimming again, and; Stephen Teague is a trauma survivor who has run four Boston Marathons for the center. Drs. Sinha and Shin are 3D-printing muscle cells; Dr. Carty is revolutionizing amputation techniques; Dr. Salim is focused on preventing traumatic injuries from happening in the first place. It is more than we could ever have imagined and has all been made possible by you.

Thank you from the bottom of our hearts.

Audrey, Steven, Danielle + Gillian

The Gillian Reny
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