CENTER FOR SURGERY AND PUBLIC HEALTH
Making Surgery Safe, Effective Affordable and Accessible For All
Message From the Kessler Director

Surgeons are embracing a greater role in the public health discourse, increasingly contributing their voices to better our understanding of health systems and the people who inhabit them. In the past, the default for surgeons had been to think of patients as individuals distinct from the communities they live in and the social determinants that dictate so much of their paths in and out of the operating room. Until recently, few surgeons had the research training and skills needed to translate their clinical experience in the operating room to the population level. It isn’t so much that surgeons weren’t aware of the burgeoning public health crises looming in surgery such as: the mismatch between physician and patient goals, a growing cost-value paradox, and racial and ethnic disparities in outcomes – but they didn’t yet have the tools to translate these conjectures into evidence-based calls to action. The Center for Surgery and Public Health (CSPH) was created to respond to this need. For more than a decade, we have served as a leader in asking difficult questions to better patient care and in giving surgeons and scientists the interdisciplinary research skillsets to answer them.

Working at the CSPH and being a Brigham Surgeon is truly the dream job for me. I am inspired and awed by our team every day – each one of us cares about making a difference, and we have the combination of resources and willpower to truly have an influence on the art and practice of surgery, and impact the health of millions from Boston to Botswana. The founding documents of the Brigham proposed building a hospital for patients who are in indigent circumstances: that’s our founding principle, and that is why fostering patient-centered care and eliminating disparities is at the heart of all CSPH activities. Being the son of immigrants myself, the opportunity to work at a place charged with doing such work felt like a true calling, and I was thrilled to join the CSPH as Kessler Director in 2014. I continue to be motivated every day by the caliber of our faculty, fellows and staff and their collective passion for their work.

Two years ago, we embarked upon a strategic planning process to outline our goals for the years to come. This resulted in our current focus on seven research program areas and we have diligently measured our progress toward achieving those goals. We’ve also identified resource gaps and opportunities for growth moving forward, and have made great strides in addressing those. We’ve secured several new grants and funding awards; we continue to conduct high level research and implementation projects leading to publications in the most high-impact journals and to real policy changes. We have also made great improvements in streamlining our processes and procedures so that we are more effective in carrying out our mission of making surgery safe, effective, affordable and accessible for all.

What has remained constant in this period of exciting growth and change has been the unwavering support from Brigham Surgery, our colleagues throughout the Harvard community and our partners across the globe. I would like to personally thank each one of our supporters- we wouldn’t be where we are today without you.

Adil Haider, MD, MPH, FACS
our story

Surgery is a central and essential tool in the preservation of human life, yet surgical care is surprisingly understudied. There is remarkably little information about the adequacy of surgical resources for meeting the needs of our aging population, the quality of surgical care and how to improve it, who has access to needed operations and who does not, or how to improve that access both at home and abroad. As one of the most documented interactions in medicine, surgical care remains a potentially powerful source of information for examining fundamental questions about the delivery of modern health care and the improvement of public health.

Michael J. Zinner, MD, past Mosely Professor of Surgery, Surgeon-in-Chief and Chair of the Department of Surgery at Brigham and Women’s Hospital, envisioned a research center at the intersection of surgery and public health that could provide direction for patients, physicians, and policymakers, and improve quality and access to care for all. In 2005, he established the CSPH as a joint initiative of Brigham and Women’s Hospital, Harvard Medical School and the Harvard T. H. Chan School of Public Health.

Since that time, the CSPH has been at the forefront of public health research of surgical care delivery within and without our nation’s healthcare system. Utilizing innovative research methodologies grounded in clinical reality, we have developed surgical safety checklists, created a national agenda for surgical disparities research, and launched the pioneering work of rising stars in surgical health services research. We are advancing the science of surgical care delivery by studying effectiveness, quality, equity, and value at the population level and training the most gifted of a new generation of physician-scientists. Together our efforts are making surgery safer, more patient-centered and more accessible in the U.S. and around the world.

goals

IDENTIFY best practices in patient-centered surgical care delivery and mitigation of healthcare disparities.

DEMONSTRATE how implementation of best practices can deliver surgical care that is safer, patient-centered, equitable and of higher quality and value.

ATTRACT a diverse group of highly motivated and talented researchers and vigorously promote the education of tomorrow’s leaders in the science of surgical care delivery and health services.

BUILD partnerships at the local, regional, national, and international levels to achieve our vision. Establish the CSPH as a source of policy influence both nationally and internationally.

TRAIN FUTURE LEADERS

EXPAND & DISSEMINATE KNOWLEDGE

ENABLING faculty to achieve success by establishing an environment of empowerment, constant improvement, support, and accountability.

IN 2018 more than 75 leaders in academic surgery trained, 40 faculty members, 20 full-time staff members, and 35 fellows and trainees.

IN 2011, of the 38.6 million hospital stays in U.S. hospitals, 29% included at least one operating room procedure. These stays accounted for 48% of the total $387 billion in hospital costs.

That same year, over 15 million operating room procedures were performed in U.S. hospitals.

The average American will have nine operations in their lifetime.


Our mission is to advance the science of surgery through research that informs policy and program development for safe, high quality, and equitable, patient-centered care in the U.S. and around the world.
The global volume of major operations now exceeds childbirths, but with death rates 10 to 100 times higher.

Avoidable surgical complications leave 7 million people dead or disabled each year, including 500,000 Americans.

Our research is unified by a focus on patient-centered care that is safe, effective, and equitable.
PROBLEM
In cancer care, patients are paying more and getting less. Spending on oncology services is increasing by over 15% annually, faster than the background growth in overall expenditures. Next-generation “precision-therapies” carry the promise of identifying and targeting specific molecular alterations in cancer cells, but many also carry extremely high price tags – some reaching six- and even seven-figures. Expensive technologies like robot-assisted surgery have become ubiquitous, alongside molecular diagnostic tests and advanced imaging modalities. Despite this influx of resources and expensive new technological advances, the death rate from the most common cancers has only slightly declined. This has led some researchers to state that we face a “value crisis” in oncology.

APPROACH
This program aims to improve the value and effectiveness of cancer care by identifying drivers of high and low-value care. We focus on policy and health systems-based changes to better understand how to improve access to high-quality cancer care that makes a difference, including screening, vaccinations, tobacco cessation, appropriate genetic testing and more, while protecting patients against high cost-sharing requirements.

IMPACT
Our work touches on a variety of topics with key relevance to today’s pressing questions in health policy. By drawing on our expertise in big data analysis, we provide insights on how policy changes may impact patients. As the repeal of the Affordable Care Act (ACA) was being debated in Congress, we published research assessing how the ACA impacted cancer screening and detection of early stage cancers. As states took Medicaid expansion to the ballot box, we provided valuable insights into the role of Medicaid expansion on utilization of surgical care and cancer screening.

Other work focuses on nationwide patterns of self-reported prostate-specific antigen screening; racial differences in the surgical care of patients with prostate cancer; effects of androgen-deprivation therapy; changes in low value care with the adoption of alternative payment models, variations in costs, and the impact of technological advances in cancer care.

The impact has already been realized: our work was cited in a 2016 Medicare rule change regarding payments for robotic surgery and has been featured in high-impact journals including JAMA, JAMA Oncology, and the Journal of Clinical Oncology. Because many of our research topics have key pertinence to issues of public policy, we have also published academic work targeted specifically at the lay public, including articles in STAT Opinion and The Boston Globe.

FUTURE WORK
The Cancer and Comparative Effectiveness Program will continue to study the best ways to deliver high-value cancer care, with interests including the improvement of access to care for minorities, reducing the financial and medical toxicities of cancer treatment, the development of innovative technologies geared toward cancer patients and the downstream effect of legislative and policy changes for cancer patients. This work could include the development of methods to identify patients at risk of side effects and the creation of new tools to mitigate these side effects.

Driving Effective Policy Change
Prostate-specific antigen (PSA) screening is a widely debated practice in the United States. PSA screening can lead to the diagnosis of non-lethal prostate cancer and consequently lead to unwarranted harm that is associated with treatment. In 2008, the US Preventive Services Task Force (USPSTF) panel recommended against PSA screening in men older than 75 years. In the field of urology, this recommendation has been controversial, primarily because it is thought to have been ineffective at reducing the observed prevalence of PSA screening among older men.

The CSPH’s Cancer Care and Comparative Effectiveness program has taken an active role in publishing research that pushes for changes to the USPSTF and its recommendations. This work has been published in journals including JAMA Internal Medicine, JAMA Oncology, and JAMA, to name a few.

Additionally, Quoc-Dien Trinh, MD, FRCS, the faculty leader of this program, is a member of the American Urological Association’s (AUA’s) legislative affairs committee. The AUA has stated that it is “actively working with lawmakers to move forward to reform the USPSTF,” creating transparency and accountability while also adding input and feedback from patients and specialists.” Dr. Trinh’s involvement in this group has allowed him to participate in press conferences and advocacy opportunities, including meetings with the Massachusetts Governor and Speaker of the House.

BLACK MEN are more likely to develop prostate cancer and to die from it than white men. Black patients are more likely to be diagnosed when tumors are more advanced and more difficult to treat.

FACULTY LEADER
QUOC-DIEN TRINH, MD, FRCSC
is the leader of the CSPH’s Cancer and Comparative Effectiveness Program, and an associate surgeon in the Division of Urology at Brigham and Women’s Hospital and Dana-Farber Cancer Institute. Dr. Trinh’s research focuses primarily on costs, patterns and outcomes of prostate cancer treatments, including robot-assisted procedures. His publications include over 500 peer-reviewed articles, book chapters, and videos. He also currently serves as the associate editor for Social Media at the Journal of Urology.
Military Outcomes Research

PROBLEM
The Military Health System’s (MHS) TRICARE health plan services 9.4 million active duty and retired military personnel and their dependents, a cohort of universally insured individuals that reflects the socioeconomic and racial demographics seen in the U.S. As healthcare costs continue to rise exponentially across the country, the Military Health System Data Repository (MDR) offers an opportunity to understand variations and drivers in healthcare utilization within the MHS and beyond, identifying areas for value optimization and better health outcomes.

APPROACH
The Comparative Effectiveness and Provider Induced Demand Collaboration (EPIC) formed in 2011 as a partnership between the CSPH and the Uniformed Services University (USU). The collaboration focuses on studying some of the most pressing healthcare challenges faced by military and civilian populations using the MDR. While initially established to identify drivers of increasing healthcare costs in the context of healthcare quality, utilization, and disparities, the collaboration has inspired a broader and deeper examination of contextual healthcare issues that impact military personnel and their dependents’ health outcomes. These include comparative effectiveness and outcomes, epidemiology, quality and practice improvement, healthcare disparities, provider-induced demand, and socioeconomic and geographic variation.

IMPACT
Through the EPIC collaboration, the Military Outcomes Research program is working to better the lives of military personnel and their families. The EPIC collaboration has brought the system to national attention comparing purchased and direct care, revealing the impact of provider-induced demand on healthcare costs. We have investigated prescription opioid use and abuse in the MHS and demonstrated that under a universal healthcare scheme, racial disparities in outcomes disappear. Publishing articles across multiple research areas since 2016, the collaboration continues to inform discussions on healthcare reform for the MHS and the nation.

Describing Evidence-based Guidelines for Prescribing Opioids
Collectively we have provided the deepest investigation to date on opioid prescribing practices in the MHS. One of our studies demonstrated that opioid prescription at hospital discharge closely matches the incidence of moderate to severe pain in trauma patients, indicating appropriate prescribing practices; while another study found that fewer than one percent of trauma victims continued opioid use one year after injury.

FUTURE WORK
With this body of work, the Military Outcomes Research program is illustrating the suitability of the MHS as a model for a universally-insured population, the value of the MDR as a research tool, and the relevance of such research to the MHS and to the U.S. as a whole. As the program continues to evolve and expand, we hope to become the center of expertise for MHS Claims data and for our findings to lead to the development of new MHS policies that will demonstrably improve military health care.

KEY PUBLICATION
Racial Disparities Mitigated for Universally Insured Military Patients
Racial disparities within the U.S. healthcare system are estimated to account for more than 83,000 deaths and an average of more than $57 billion per year, and are often attributed to the lack of insurance or access to care among minority populations. Even with the passage of the Affordable Care Act and an increase in insurance coverage and access to care, disparities in outcomes persist in minority populations. A longitudinal analysis by the CSPH’s Military Outcomes Research program published in the Journal of Trauma and Acute Care Surgery was the first of its kind to find that racial disparities are mitigated among a population of universally insured military patients.

Researchers from this program analyzed five years (2006-2010) of TRICARE data. Emergency General Surgery (EGS) conditions (which include a wide spectrum of procedures for the upper and lower gastrointestinal tract, hepatobiliary and pancreatic disease, soft tissue infections, and hernias) were primarily chosen because their emergent nature is thought to lessen subjective external factors. Researchers looked at mortality, major morbidity, and readmission rates for 101,011 EGS patients representing four racial groups (white, black, Asian, or other), a population which is broadly representative of the insured American public. They found no differences in mortality and readmission rates at 30, 90 or 180 days for patients across racial groups, and only minimal differences in major morbidity between black and white patients. These findings are a stark departure from the gaping disparities which have been demonstrated among those in the general (civilian) population, and demonstrate the team’s commitment to the adage that “in the MHS, the color of the uniform is more important than the color of the skin.”

PAINKILLER prescriptions that lead to prolonged opioid use tend to be written by doctors in outpatient settings, not hospitals.

PROBLEM
Healthcare systems, whether at an individual hospital-level or encompassing an entire state, are tasked with providing individual care at scale. Designing systems to resolve tensions between cost and quality, efficiency and patient-centered care are at the heart of this health policy challenge. Appropriate care requires identification of which outcomes are most important to patients, and working to design a system that improves access to care and eliminates disparities. Policymakers rely on groups like the Program on Patient-Oriented Policy and Practice (PPOPP) to achieve these important objectives.

APPROACH
PPOPP produces research focused on conceptualizing and implementing policies that encourage the use of best practices in health services settings, incorporate sustainable financing models, and foster a healthcare system that is affordable and accessible to all. A major focus within this work is the evaluation of questions and outcomes that are meaningful and important to patients and caregivers, and crafting policies that are respectful and representative of these individual patient preferences.

IMPACT
As the CSPH’s epicenter for health policy research, PPOPP is home to a multitude of projects, from identifying and disseminating best practices in Medicare Accountable Care Organizations to developing an alternative payment model under the Medicare Access and CHIP Reauthorization Act. Identifying barriers, facilitators, and outcomes of Advanced Care Planning Although the use of palliative and hospice care for terminally ill Medicare patients is growing, large numbers of Americans die following intensive, non-curative, burdensome treatments. Available evidence suggests that advanced care planning discussions are associated with less aggressive end-of-life care, greater concordance between the care patients prefer and the care they receive, and perhaps improved bereavement outcomes for caregivers. However, national data on the uptake and impact of advanced care planning conversations between patients and providers (ACP) are lacking. As a result of a new policy from the Centers for Medicare and Medicaid Services (CMS), effective January 1, 2016, clinicians may now bill for having ACP discussions with their patients. This provides an unprecedented opportunity to study the use and impact of these discussions on a national basis. This study, which began in September 2017, will use both quantitative and qualitative methods to provide a unique scientific examination of the use of ACP discussions and their impact on the intensity and outcomes of care received by seriously ill patients nearing the end of life.

Improving Patient Safety with Medical Device Identifiers
Until recently, patients, clinicians, payers, and manufacturers lacked a reliable and timely way to get information on the performance of medical devices (such as stents and artificial joints) after they had been surgically implanted. PPOPP’s UDIClaims project is funded by the Patient-Centered Outcomes Research Institute (PCORI) to look at the feasibility of transmitting Unique Device Identifiers (UDIs) from clinical Electronic Health Record (EHR) systems to insurance claims. The CSPH’s PPOPP has partnered with Blue Cross Blue Shield of Massachusetts along with working groups from multiple hospital departments and representing a wide spectrum of specialties and expertise. Together, these working groups are collaborating to design and pilot a system that will reliably capture data from multiple sources, link, analyze, and synthesize it to make the results available to stakeholders as well as researchers. This information will promote transparency for patients, allowing timely warning in case of an implant’s defect or failure, and support evaluations of device effectiveness.

FUTURE WORK
PPOPP continues to advance public health policy research in surgery care delivery, and provide a leading voice in payment policy, end-of-life care, and policy-oriented human services research.

The EQUALITY Study
The CSPH’s Emergency Department Query for Patient-Centered Approaches to Sexual Orientation and Gender Identity (EQUALITY) Study is looking for the best way to collect Sexual Orientation and Gender Identity (SO/GI) information from patients in the Emergency Department (ED). This multisite, multi-year study leverages an exploratory sequential mixed-methods design. First, researchers conducted 79-in-depth qualitative study (53 patients and 26 providers) in the Baltimore, MD and Washington, DC area. With feedback from a Stakeholder Advisory Board, the results from these interviews informed the development of quantitative surveys, which were then administered to 1,316 potential patients who identified as lesbian, gay, bisexual and straight, and 429 ED providers, including both physicians and nurses. Several publications have resulted from the three phases of the study. One of the most recent, in JAMA Internal Medicine, found that 77.8 percent of physicians thought patients would refuse to provide their SO/GI to the ED. However, only 10.3% of patients said they would refuse to provide such information. The CSPH plans to apply for a Dissemination and Implementation funding to apply findings from the EQUALITY Study in more emergency care situations.
Surgical Culture: Simulation-Based and Non-Technical Skills Training

PROBLEM
Leaving an instrument or sponge in a patient at the end of an operation seems like an unthinkable act. Yet, despite the best efforts of diligent and dedicated operating room (OR) staff, such events happen once in every 5,500 to 8,000 operations. Research shows that around 10% of hospital patients are unintentionally injured during their treatment. A lack of non-technical skills such as situation awareness, leadership and teamwork has been associated with a significant number of surgical errors, compromising patient safety and accounting for half of the adverse events in the OR, with CRICO linking a third of medical malpractice cases to communication breakdowns.

APPROACH
The Surgical Culture Program aims to improve patient outcomes by understanding how the non-technical skills of surgeons and surgical teams affect performance in and out of the OR. We aim to determine which behaviors associated with specific non-technical skills make a difference, and formalize training in this area to enhance performance in the most efficient manner, with maximum impact on process and outcomes.

IMPACT
Our group has created and led a team training program using high fidelity simulation to teach teamwork and communication to full OR teams of surgeons, anesthesiologists, and nurses. Conducted at the Neil and Elise Wallace STRATUS Center for Medical Simulation, these simulation sessions focus on the important non-technical skills with the goal to improve the safety culture in the ORs at Brigham and Women’s Hospital, while also improving patient care and surgical outcomes.

Creating a U.S. Version of Non-Technical Skills for Surgeons (NOTSS-US)
The Non-Technical Skills for Surgeons (NOTSS) behavior rating tool was created to assess and improve surgeons’ nontechnical skills, such as situation awareness, decision-making, communication, teamwork and leadership. Developed at the University of Aberdeen in Scotland by Steven Yule, PhD, one of the two leaders for the Surgical Culture Program, and his colleagues, the NOTSS curriculum has been implemented throughout the UK and much of Europe. In collaboration with the Division of Education at the American College of Surgeons, we are working to develop a U.S.-based version of the curriculum and assessment tool, utilizing an expert panel through structured methods of instructional systems design and validating the resultant NOTSS-US with a multi-institutional study at a number of surgery residency programs.

Responding to Emergencies in Space
Earth and space may be vastly different settings, but they share a common need: clinically trained staff who can skillfully respond to medical emergencies. A multidisciplinary team including members of the CSPH’s Surgical Culture program are venturing outside of their usual orbit to develop a tool that can help astronaut crews respond to medical emergencies in deep space.

Yule and an interdisciplinary team of researchers from the STRATUS Center and BWH’s Center for Surgery and Public Health, as well as experts from other institutions, are now developing and assessing a non-technical skills training program for astronauts to manage a medical event on human-exploration missions to Mars, near-Earth asteroids or the moon. The team – which recently received a $400,000 grant from NASA’s National Space Biomedical Research Institute to fund the project – consists of experts in training and simulation, human factors, emergency medicine and surgery.

The first part of the project involved identifying and assessing which skills are essential for astronaut crews for responding to in-flight medical emergencies effectively, with the goals of enhancing proficiency, reducing errors and improving patient outcomes. The second part of the project was to create a simulated spacecraft medical bay in the STRATUS Center and film a series of simulation scenarios to evaluate the validity and reliability of the assessment tool.

Provider Awareness and Cultural Dexterity Toolkit for Surgeons
Cultural dexterity – the ability to navigate interactions with people from different beliefs and backgrounds – is a critical skill that could help clinicians address healthcare disparities and improve outcomes for patients. The Provider Awareness and Cultural Dexterity Toolkit for Surgeons (PACTS) Project, funded by the Harvard Surgical Affinity Research Collaborative, aims to improve surgical culture by creating, piloting, and assessing a cultural dexterity curriculum tailored to surgical residents.

Pregnancy during Surgical Residency Training
Women remain underrepresented in the surgical field, and some prior studies have suggested that the desire to have a family may deter women from a surgical career. The current support of pregnant residents by training programs is variable, and most women surgeons report negative stigma is associated with pregnancy during residency. Our program is currently working to characterize the experience of women surgeons who have become pregnant during training, including identification of challenges and areas with the greatest potential for improvement.

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**PRIORITIES**

**Surgical Health Scientists Aligning Research with Patient Priorities (SHARPP)**

**PROBLEM**

Our current healthcare system measures providers based on a set of standardized outcomes that may not reflect what patients truly want from their health care, especially for patients with complex medical needs. As a result, patient and provider priorities may not always align, leading to discordant care. The Surgical Health Scientists Aligning Research with Patient Priorities (SHARPP) Program at CSPH believes that the priorities of the patient matter, and that not only should these priorities be incorporated into the standards by which providers are measured, but also that patients should play a central role in the decision-making process regarding their care. This approach allows patients to assess the outcomes and goals they hold for themselves, and surgeons to provide care that aligns with their patient’s priorities.

**APPROACH**

The SHARPP Program conducts patient-centered research focused on surgical patients with serious illnesses facing complex surgical procedures. The vision of the SHARPP Program is to create an internationally renowned group of clinician-scientists and health services researchers who conduct patient-centered research in all phases of surgical care. The SHARPP Program aims to achieve this through unparalleled leadership in the following ways: making significant contributions to the scientific evidence base, developing and implementing novel programs, and by engaging key stakeholders in surgical care to influence health policy.

**IMPACT**

With a team that includes more than a dozen researchers and collaborators, the SHARPP Program’s project portfolio continues to expand, covering a wide range of research topics and implementation strategies dedicated to making surgical care more patient-centered and developing protections for vulnerable groups. Projects include: a pilot study on collecting patient-reported outcome measures for older emergency general surgery (EGS) patients; secondary data analysis to describe the 12-month healthcare trajectory and hospice utilization among older trauma and EGS patients; identifying best practice guidelines for older injured adults; developing quality of life and functional measures for older patients; and incorporating them into the National Surgical Quality Improvement Program (NSQIP); and ensuring that shared decision making is routinely incorporated into the Perioperative Medicine Curriculum during anesthesia residents’ Weiner Center rotation at BWH.

**FUTURE WORK**

Much work remains in the effort to improve the quality of perioperative care for seriously ill and older surgical patients. Future work aims to shape clinical and policy initiatives to integrate geriatric and palliative processes of care in the treatment of complex older surgical patients, to demonstrate the efficacy of geriatric and palliative care processes in elective and non-elective surgery through R01 (or equivalent) funded studies, and to produce major publications to redefine metrics of quality care for older surgical patients.

We also aim to study and expand programs to educate perioperative clinicians about the care of complex older patients and to train future leaders in the fields of surgical palliative care and geriatric surgery by securing the following: sustainable funding for a SHARPP post-doctoral fellow, funding and mentorship for junior faculty, and establishing a Perioperative Medicine Fellowship.

**KEY PUBLICATION**

*Survival, Healthcare Utilization, and End-of-life Care Among Older Adults with Malignancy-associated Bowel Obstruction*

Malignancy associated bowel obstruction (MBO) is a late complication of intra-abdominal malignancy for which surgeons are frequently consulted. Decisions about palliative treatments, which include medical management, surgery, or venting gastrostomy tube (VGT), are hampered by the paucity of outcomes data relevant to patients approaching the end of life. Through this study of Medicare data for patients 65 years or older with stage IV ovarian or pancreatic cancer who were hospitalized for MBO, we have concluded that VGT is associated with fewer readmissions and lower intensity healthcare utilization at the end of life than medical management or surgery.

The overall median survival after the first MBO admission was less than 3 months, underscoring the relevance of end of life outcomes in delivering patient-centered care for these patients. Nonetheless, fewer than 5% had palliative care consultation. Our findings argue that because patients can expect to die in weeks to months after a diagnosis of MBO regardless of management, conversations about priorities for end of life care and discussions about treatment options in the context of these priorities are appropriate for all patients. Given the limited survival, regardless of management, hospitalization with MBO carries prognostic significance and presents a critical opportunity to identify patients’ priorities for end-of-life care.

**30 days**

For older patients with severe traumatic brain injury, hospitals with the lowest in-hospital mortality perform fewer high-intensity treatments at the end of life and enroll more patients in hospice without increasing cumulative mortality 30 days or less after discharge."

PROBLEM
Trauma is the leading cause of death for individuals up to the age of 45 years, and the fourth most prevalent cause of death overall. Emergency General Surgery (EGS) has become a critical national health issue with more cases per year than new diagnoses of cancer or diabetes in the U.S. Trauma and EGS patients are a vulnerable and important population, and research is needed to reduce the human and societal burden of these diseases and improve their outcomes.

APPROACH
The Trauma, Emergency General Surgery, and Long-Term Outcomes program investigates the burden and outcomes of this vulnerable group of patients and aims to implement systems and processes to positively affect these outcomes. Using a patient-first approach, our goal is to define the best evidence to improve short-term and long-term outcomes and reduce the impact on patients and healthcare systems of trauma and emergency general surgery.

IMPACT
Trauma and EGS patients represent unique populations of the most-at-risk surgical patients, facing a disproportionate burden of medical errors, complications, and death. Our research focuses on identifying factors that affect mortality and morbidity and evaluating ways to modify those factors to improve outcomes. Our work has helped guide the national research priorities within the field of Emergency General Surgery. We are learning how to improve organ donation rates among minorities, decrease the incidence of surgical site infections, and better care for older and frail patients.

KEY FINDINGS
Seven EGS Procedures Account for 80 Percent of Costs
The program has authored numerous publications. Notably, Joaquim Havens, MD, and colleagues published a study in JAMA Surgery which identified seven emergency general surgery procedures which accounted for 80 percent of the national burden of operative EGS (admissions, deaths, complications, and inpatient costs). This finding holds significant bearing for quality benchmarks and cost reduction efforts, which should focus on these common, complicated, and costly EGS procedures.

Understanding Long-Term Patient-Reported Outcomes After Trauma
Injury remains the most significant cause of death in Americans under 44 years old and the fourth most prevalent cause of death overall. Injuries can result in long-term disability, however trauma outcomes are frequently measured only by 30-day mortality and morbidity. While these short-term outcome measures are meaningful and helpful to examine, they often fail to capture long-term outcomes which in many cases are more impactful for patients.

The CSPH’s Functional Outcomes and Recovery After Trauma Emergencies (FORTE) study is collecting data from patients to understand the long-term recovery experience after traumatic injury. Team members are building a database of long-term patient-reported outcomes after trauma to measure factors that are meaningful to patients and their families, including functional status, health-related quality of life, symptoms and treatment adherence, and more. To collect this information, team members have made thousands of phone calls to trauma patients at three institutions: Boston Medical Center, Brigham and Women’s Hospital, and Massachusetts General Hospital. This information, when added to a registry, will help patients and providers anticipate long-term outcomes of a specific condition and inform decisions about care. It will also help researchers, clinicians, and policymakers understand the impact of specific treatments and systems of care on trauma outcomes.

Improving EGS with a Preoperative Checklist and Intraoperative Huddle
With funding from CRICO, the CSPH’s Trauma and Rehabilitation Outcomes program began a multi-year project to identify specific modifiable factors associated with excess morbidity and mortality associated with EGS and to address those factors by developing and pilot-testing a novel, multidisciplinary tool. The tool consisted of a brief pre-operative checklist and an intra-operative huddle. A team at the CSPH has been involved in training members of operative teams to empower team members to identify critical points during an emergency procedure and initiate the necessary evidence-based intervention to minimize error, complications and death, and malpractice risk. Investigators led several rounds of training, conducted pre- and post-surveys, and held qualitative interviews to evaluate success.

JOAQUIM HAVENS, MD
is a trauma and emergency general surgeon and surgical intensivist at Brigham and Women’s Hospital. He is the director of emergency general surgery in the Division of Trauma, Burns, Surgical Critical Care and Emergency General Surgery at Brigham and Women’s Hospital. He is an assistant professor of surgery at Harvard Medical School. His research focuses on the optimal delivery of care to trauma and emergency general surgery patients.

70%
Global Surgery: Capacity Building and Systems Innovation

PROBLEM
According to The Lancet’s Global Surgery 2030 report, more than five billion people lack access to safe, affordable surgical and anesthesia care when needed. Meeting the actual global surgical disease burden would require adding a minimum of 134 million operations every year, primarily in the poorest regions of the world where there is a severe deficit in healthcare workforce and infrastructure. Moreover, of those who can access surgical care, 33 million individuals face catastrophic health expenditure each year as a result of costs incurred.

APPROACH
The CSPH’s Global Surgery Program is professionalizing global surgery to reach the neglected surgical patient. Through deep capacity-building, developing global surgery leaders, and linking to broad international surgical assessments and advocacy efforts, the Global Surgery Program is working to improve access to surgery for all.

IMPACT
From the program’s early days working on the World Health Organization Surgical Safety Checklist, which helped to reduce surgery-related deaths and complications around the globe, Brigham and Women’s Hospital has been a leader in advocating for the indispensable role surgery plays in global health.

Capacity Building and Systems Innovation
Working in concert with academic medical centers, professional societies, non-governmental organizations, and Ministries of Health, we focus on building long-lasting partnerships to support sustainable and innovative efforts to build surgical systems and research capacity in developing healthcare systems. In addition to serving as coordinator for U.S. academic medical centers for Rwanda’s HRH Program, the Global Surgery Program partnered with Harvard Medical School to develop and implement an Intermediate Operational Research Training (IORT) course in Rwanda, producing peer-reviewed scientific publications with Rwandan first-authors. First rolled out at the University of Rwanda for a multidisciplinary cohort of surgeons, obstetricians, and anesthesiologists, Non-technical Skills for Surgeons: Variable Resource Contexts (NOTSS-VRC) is a contextually-adjusted course designed to improve operating room behaviors that impact patient safety.

The course was designed and implemented by a team of CSPH and Rwandan faculty and trainees, utilizing text and video content created in Rwanda.

Future Global Health Leaders
In close collaboration with the Program in Global Surgery and Social Change at Harvard Medical School, we are identifying and training global health leaders, providing opportunities to engage at the research, advocacy, and policy levels. We have been fortunate to see our research fellows make significant contributions to the field and lay the groundwork for their future academic path, establishing themselves as global surgery faculty around the country, including at the Brigham. Our fellows have contributed to the evidence-based policy recommendations put forth in the Lancet Commission on Global Surgery publication: “Global Surgery 2030”, served as primary consultants on National Surgical Obstetric and Anesthesia Plans for countries seeking to improve their surgical capacity, researched surgical device and process innovations for tracking surgical outcomes for quality improvement, and demonstrated that the same surgery and public health themes resonate both in the U.S. and abroad.

Policy and Advocacy Engagement
As a founding member of the Global Alliance for Surgical, Obstetric, Trauma, and Anesthesia Care (G4 Alliance), the CSPH continues to take a leading role in advocating for Global Surgery’s inclusion in international global health agendas and disseminating best practices. The CSPH faculty have partnered with the American College of Surgeons (ACS) Operation Giving Back program to develop a pre-congress educational program entitled, “Global Health Competencies for Surgeons: Cognitive and System Skills”. We are also working with ACS to establish a Consortium of Academic Global Surgery Programs to provide a forum for setting national standards for academic engagement in global surgery training.

FUTURE WORK
The Core Faculty of the Global Surgery Program – Robert Riviello, MD, MPH, Gita Mody, MD, and Deepika Nehra, MD – continue to lead quality improvement, surgical capacity building, and innovative educational initiatives in Rwanda, Uganda, Haiti, and Peru, carrying on a legacy of strong partnership building.

Strong themes are emerging in global surgery – the rising global risk of antimicrobial resistance, the role of injury as an integral public health issue, and the need to support the new generation of young surgical faculty. Taking lessons learned from previous implementation efforts in Haiti, we are studying and changing standard of care for surgical site infections in rural Rwanda utilizing mHealth applications. Our faculty and fellows are currently engaged in Rwanda’s National Surgery Planning process, in partnership from the Rwanda Surgical Society and Ministry of Health, to create a roadmap for development of surgical services that will be written into the National Ministry of Health Sector Wide Plan 2018. In Peru, Dr. Gita Mody is partnering on hospital-based surgical quality improvement initiatives and mapping out the surgical referral process challenges for the growing cohort of patients suffering from multidrug-resistant tuberculosis (MDR-TB). And in Uganda, Rwanda, and Haiti, Dr. Deepika Nehra is innovating context-specific surgical trauma education to improve response to the rising tide of road traffic injuries and other causes of traumatic injury that threaten developing economies.

DEEPIKA NEHRA, MD
is an associate surgeon, in the Division of Trauma, Burn, Surgical and Critical Care, spending 90% of her year at the Brigham and the remainder working in low-resource settings with partners in Rwanda, Uganda, and Haiti. Dr. Nehra combines her interest in education and research to better understand and improve trauma-related outcomes in resource-limited settings, including the development of a Surgical Trauma Skills Course for low-resource settings that she has implemented in Rwanda, Uganda, and soon Haiti.

ROBERT RIVIELLO, MD, MPH
The Global Surgery Programs Director, Robert Riviello, MD, MPH, is an associate surgeon, in the Division of Trauma, Burn, Surgical and Critical Care at the Brigham and an assistant professor of Surgery and of Global Health and Social Medicine at Harvard Medical School. Dr. Riviello has dedicated his career to improving surgical access for vulnerable people. Over the past decade he has dedicated his time between BWH and sub-Saharan Africa, strengthening surgical services, surgical training programs, surgical device innovation, and providing mentorship to the CSPH’s global surgery fellows.

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Building Surgical Capacity in Rwanda

An imposing obstacle to improving access to health care is the global shortage of 41.3 million health professionals, disproportionately impacting vulnerable and impoverished communities around the world. One of the world’s poorest countries, Rwanda was devastated by genocide in 1994, with the average life expectancy falling below 40 years, and experienced a vast exodus of its health workforce. By 2012, Rwanda had taken great steps in rebuilding its health system, turning around child and maternal mortality, but faced a steep challenge in sustaining those gains and taking on the untouched burden of injury and non-communicable diseases, including cancer.

In 2012, the Human Resources for Health (HRH) Program was formed to rebuild the country’s health care education infrastructure and workforce. When the HRH Program began, 85% of surgeries performed at the University of Rwanda Teaching Hospital in Kigali (CHUK) were emergency procedures, overwhelming an already strained health system. The HRH program supported the recruitment of U.S. faculty across the healthcare spectrum via a consortium of U.S. universities to establish a sustainable higher education system in Rwanda that would produce sufficient numbers of competent, specialized health professionals to meet national need. Acting as consortium coordinator for all 22 U.S. academic institutions, Brigham and Women’s Hospital also provided more than 50 full-time employees across the entire program, including surgeons, anesthesiologists, internists, radiologists, psychiatrists, and pediatricians.

In 2019, the Program is set to double Rwanda’s 2012 physician workforce and greatly scale up the number of physicians with advanced training. In addition to increasing training output, the HRH Program sought to improve the quality of the training programs, integrating competency-based training and pedagogic innovation, building a stronger educational administration, and expanding accessibility to better equipment and supplies at teaching hospitals. As co-principal investigator and U.S. Surgery Faculty Liaison, over the past six years Dr. Robert Riviello has spent up to 75% of his time in Rwanda supporting the advancement of the University of Rwanda Surgery Residency Program and continues to work to support the professional development of the new cohorts of Rwandan surgeons. Today, thanks to improvements in referral systems and the decentralization of surgical services, emergency surgeries now constitute only 35% of CHUK’s surgical volume and waiting times for surgery have dropped from one year to one month.

from policy to practice: strategies for transforming surgical care delivery

From its beginning, the CSPH has endeavored to inform policy and transform practice, translating cutting edge public health research into implementable policy change at all levels of the health system. Dissemination strategies are a part of every research project undertaken by the Core Programs, connecting research with reality. Through various means, the CSPH convenes a wide array of multidisciplinary experts and stakeholders, including patients, engaging in and leading the most challenging discussions happening in public health research today.

NIH-ACS Symposium on Surgical Disparities Research

Optimal access is the key to delivering quality care and eliminating disparities. Efforts to increase surgical presence and availability are crucial to providing the right care, at the right time, in the right place. To bring together thought leaders in the field of surgical disparities research and to highlight the need for funding in this area, the CSPH organized and facilitated the National Institutes of Health-American College of Surgeons Symposium on Surgical Disparities Research in May of 2015.

Hosted by the National Institute on Minority Health and Health Disparities (NIMHD) and the American College of Surgeons (ACS), more than 60 top-level researchers, surgeon-scientists and federal leaders attended the two-day event, which resulted in the creation of the first national research agenda to support surgical disparities research. Published in JAMA Surgery article entitled, “Setting a National Agenda for Surgical Disparities Research: Recommendations from the National Institutes of Health-American College of Surgeons Summit.” This research agenda directly led to the identification of surgical disparities research as one of the top priorities for the NIH and the resulting creation of two new funding streams dedicated to supporting this type of research.

Harvard Surgical HSR Speaker Series

Our Harvard Surgical Health Services Research (HSR) Speaker Series continues to serve as an effective way for our fellows, trainees and staff to meet with academic surgery leaders from across the country. Hosted by the CSPH in collaboration with Massachusetts General Hospital’s (MGH) Codman Center, Beth Israel Deaconess Medical Center’s (BIDMC’s) FIRST program, and Boston Children’s Hospital, this speaker series showcases Health Services Research (HSR). This series has flourished and thrived under the leadership of Zara Cooper, MD, MSc, the CSPH’s deputy director for strategy and partnerships.
resources

The CSPH supports more than 35 faculty and 30 research fellows and trainees, providing a friendly research environment and robust infrastructure. With an extensive selection of datasets and analytical software available through the CSPH's internal server, the CSPH provides affiliate Brigham faculty and research fellows access to the resources necessary to conduct pioneering surgical health services research. The CSPH brings together a talented staff of project managers, administrative leaders, biostatisticians, and experienced researchers, conveniently located in Boston's Longwood Medical Area near Harvard Medical School and the Harvard T.H. Chan School of Public Health, inspiring and facilitating multidisciplinary collaborations.

FROM PATIENT TO POPULATION - THE POWER OF DATA

State inpatient data, encompassing more than 20% of all U.S. hospital discharges with mixed geographic coverage

<table>
<thead>
<tr>
<th>Database Description</th>
<th>Geographical Coverage</th>
</tr>
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<tbody>
<tr>
<td>State Inpatient Databases (STID): Arkansas, California, Florida, Kentucky, Michigan, Minnesota, Nevada, New Jersey, Oregon. Healthcare Cost and Utilization Project (HCUP)</td>
<td>7,000,000 hospital stays each year Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS)</td>
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<tr>
<td>Healthcare Cost and Utilization Project (HCUP), Kid’s Inpatient Database - all payer pediatric inpatient database</td>
<td>3,000,000 pediatric hospital stays</td>
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<tr>
<td>Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS)</td>
<td>30,000,000 emergency visits</td>
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<tr>
<td>Healthcare Cost and Utilization Project (HCUP), Nationwide Readmissions Database (NRD)</td>
<td>15,000,000 hospital readmissions</td>
</tr>
<tr>
<td>National Trauma Database (2007-2013)</td>
<td>10,000,000 uniformed service personnel, their dependents, retirees, and retiree beneficiaries</td>
</tr>
<tr>
<td>National Trauma Database (2017-2018)</td>
<td>6,000,000 trauma cases annually</td>
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</tbody>
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SURGICAL INVESTIGATOR TIPPING POINT AWARD

To inspire and support new transformative health services research on surgical care and outcomes, the CSPH created the Surgical Investigator Tipping Point Award. Designed to help faculty pursue the pilot data needed to obtain extramural funding, the Award provides the necessary start-up funding for potentially cutting-edge research and up-and-coming investigators. Each $40,000 award may be used towards data collection efforts, analyst time, project manager support, and other necessary items needed to develop extramural funding proposals. Two awards will be made, with one granted every six months over the next year. In its inaugural year, the Award recognized the work of Joaquim Havens, MD, and Nelya Melnitchouk, MD, two rising stars in their respective fields of Emergency General Surgery and Colorectal Cancer.

RECIPIENTS
fellowship program

As one of the premiere programs in the country dedicated to surgical services research, the CSPH’s Fellowship is at the heart of our mission, and central to our goal of educating the next generation of leaders in the field. We provide surgical residents and post-doctoral fellows with the educational opportunities, mentoring support, and resources necessary to launch their careers as surgical scientists. The CSPH’s culture fosters a diverse portfolio of multidisciplinary research interests while creating synergies around compelling health services and policy questions. With support in the form of research development, project management, and biostatistical programming expertise, the CSPH advances the research agendas of its faculty members and research trainees. A central space brings fellows together with faculty, biostatisticians, and administrative staff, creating a “think tank” environment that improves the efficiency and flow of ideas and skills, and facilitates access to data, tools, and the CSPH’s collective expertise.

Today, the CSPH is home to more than 35 fellows and research trainees whose work is shaped and guided by their faculty mentors and by Andrew Schoenfeld, MD, MSc, the CSPH’s Fellowship Education Director. Fellows develop and implement highly structured fellowship plans, driven by their individual goals and research interests and facilitated by a team of primary and secondary mentors. Other aspects of our fellowship program, including our weekly Works-in-Progress sessions, are designed to provide our fellows with the feedback and resources they need to succeed. Since the program’s inception, CSPH fellows have been consistently recognized regionally and nationally for their excellence in research, resulting in numerous awards, presentations, and publications. To date, the CSPH has trained over 75 fellows, who have gone on to become leaders in the field, contributing to the growth and improved understanding of the science of surgical care delivery.

Training the Next Generation of Leaders in Academic Surgery

“The skill set that I’ve acquired from my time as a CSPH fellow, from statistical methods to grant-writing and public-speaking, has not only prepared me for a career in academic surgery, but has also empowered me to interpret and report medical literature in a more articulate and meaningful way to guide my clinical decision-making.”

Nidhi “Rhea” Udyavar, MD (2016-2018)

“My fellowship at CSPH has allowed me to pursue an MPH at the Harvard T.H. Chan School of Public Health. Every day brings a new challenge, and I’ve been able to explore topics that I would’ve never been able to otherwise.”

Rebecca Scully, MD, MPH (2015-2017)

“Being a research fellow at CSPH has been a truly transformative experience. The skills, knowledge, and habits I developed while at CSPH equipped me to collaborate with others from a variety of disciplines in order to make meaningful contributions to surgical research. I learned how to ask better questions and how to build the right team to help answer them in a rigorous and useful manner. I was also fortunate to have great mentors who helped me discover and hone my passion for surgical research, while helping me to engage in the larger academic surgical community. It has been a real inflection point in career development and one of the key highlights of my residency training.”

John W. Scott, MD, MPH (2013-2016)

“Working alongside some of the brightest minds in academic surgery is both humbling and inspiring. As a Harvard Business School MBA candidate, I have been able to apply my skills to projects that will improve quality and patient safety.”

Peter Najjar, MD, MBA (2014-2016)

“Working with such talented colleagues to tackle complex issues at the forefront of surgery and public health was a truly transformative experience. The years I spent at CSPH have certainly shaped my career trajectory and given me the tools I will need for a successful career as an academic surgeon and health services researcher.”

We envision a world where surgery is safe, effective, affordable, and accessible for all.
vision for the future

With each passing year, we make progress in our mission to advance the science of surgery through research that informs policy and program development for safe, high-quality, and equitable, patient-centered care in the US and around the world.

Each program has been tasked with identifying goals that include considerations for funding, staffing, and the allocation of resources to ensure efficiency and sustainability. We’ve introduced new and creative mechanisms, like our Surgical Investigator Tipping Point award, designed to allow Department of Surgery faculty to pursue the pilot data needed to obtain extramural funding for programs that will eventually make a significant impact on patients and outcomes. We’ve improved the foundation of our fellowship program, and have positioned ourselves at the epicenter of the movement to eliminate disparities. We’ve also incorporated feedback from key stakeholders including BWH’s Department of Surgery, and our colleagues at Harvard Medical School and the Harvard T. H. Chan School of Public Health to ensure we’re meeting the needs of our faculty and collaborators.

As a center, we anticipate continued growth and recognition as we continue to publish and disseminate groundbreaking findings, supplement our diversified funding mix and build our reputation as one of the most prominent and innovative centers focused on generating research at the intersection of surgery and public health.