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CONTRIBUTORS

Joe Alper, Melissa French, and Alexis Wojtowicz, Rapporteurs; Board on Population Health and Public Health Practice; Health and Medicine Division; National Academies of Sciences, Engineering, and Medicine

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HEALTH SYSTEMS INTERVENTIONS TO PREVENT FIREARM INJURIES AND DEATH

PROCEEDINGS OF A WORKSHOP

Joe Alper, Melissa French, and Alexis Wojtowicz, *Rapporteurs*

Board on Population Health and Public Health Practice

Health and Medicine Division

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PLANNING COMMITTEE ON HEALTH SYSTEMS INTERVENTIONS TO PREVENT FIREARM INJURIES AND DEATH[1]

GEORGE J. ISHAM (*Chair*), Senior Fellow, HealthPartners Institute
DAVID BRENT, Academic Chief, Child and Adolescent Psychiatry, Endowed Chair in Suicide Studies, Western Psychiatric Institute and Clinic; Professor of Psychiatry, Pediatrics, Epidemiology and Clinical Translational Science, University of Pittsburgh School of Medicine
CARNELL COOPER, Founder, Violence Intervention Program; Adjunct Professor of Surgery, University of Maryland School of Medicine; and Chief Medical Officer, Northeast Methodist Hospital, San Antonio, Texas
JOEL A. FEIN, Professor of Pediatrics and Emergency Medicine, University of Pennsylvania Perelman School of Medicine; Co-Director, Children's Hospital of Philadelphia Violence Prevention Initiative; and Research Co-Director, National Network of Hospital-Based Violence Intervention Programs
STEPHEN HARGARTEN, Director, Comprehensive Injury Center; Professor of Emergency Medicine, Medical College of Wisconsin
THEA L. JAMES, Associate Professor of Emergency Medicine, Associate Chief Medical Officer, Vice President of Mission, and Director of the Violence Intervention Advocacy Program, Boston Medical Center
LUCAS P. NEFF, Assistant Professor of Pediatric Surgery, Wake Forest University Baptist Medical Center
JOHN A. RICH, Professor of Health Management and Policy, and Director, Center for Nonviolence and Social Justice, Drexel University School of Public Health
THERESE S. RICHMOND, Andrea B. Laporte Professor, Associate Dean for Research and Innovation, University of Pennsylvania School of Nursing; Penn Injury Science Center
ALI ROWHANI-RAHBAR, Bartley Dobb Professor for the Study and Prevention of Violence, Associate Professor of Epidemiology, and Pediatrics, Violence Prevention Section Leader at Harborview Injury Prevention and Research Center, University of Washington

[1] The National Academies of Sciences, Engineering, and Medicine's planning committees are solely responsible for organizing the workshop, identifying topics, and choosing speakers. The responsibility for the published Proceedings of a Workshop rests with the workshop rapporteurs and the institution.

Health and Medicine Division Staff

MELISSA G. FRENCH, Senior Program Officer
ALEXIS WOJTOWICZ, Research Associate
ROSE MARIE MARTINEZ, Senior Board Director, Board on Population Health and Public Health Practice

Reviewers

This Proceedings of a Workshop was reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that will assist the National Academies of Sciences, Engineering, and Medicine in making each published proceedings as sound as possible and to ensure that it meets the institutional standards for quality, objectivity, evidence, and responsiveness to the charge. The review comments and draft manuscript remain confidential to protect the integrity of the process.

We thank the following individuals for their review of this proceedings:

THEODORE CORBIN, Drexel University
DEBRA HOURY, Centers for Disease Control and Prevention
JOSEPH RICHARDSON, University of Maryland
PAOLA RIJOS-SAITTA, Institute for Public Health

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the content of the proceedings nor did they see the final draft before its release. The review of this proceedings was overseen by **ANTONIA M. VILLARRUEL,** University of Pennsylvania School of Nursing. She was responsible for making certain that an independent examination of this proceedings was carried out in accordance with standards of the National Academies and that all review comments were carefully considered. Responsibility for the final content rests entirely with the rapporteurs and the National Academies.

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Acronyms and Abbreviations

AAP	American Academy of Pediatrics
ACA	Patient Protection and Affordable Care Act
ACEP	American College of Emergency Physicians
AFFIRM	American Foundation for Firearm Injury Reduction in Medicine
AHA	American Hospital Association
CALM	Counseling on Access to Lethal Means
CDC	Centers for Disease Control and Prevention
CTI	critical time intervention
DLIVE	Detroit Life Is Valuable Everyday
EHR	electronic health record
ERPO	extreme risk protective order
FACTS	Firearm Safety Among Children and Teens consortium
HAV	Hospitals Against Violence
HIPAA	Health Insurance Portability and Accountability Act
HVIP	hospital-based violence intervention program
IOM	Institute of Medicine
IPV	intimate partner violence

NIMH	National Institute of Mental Health
NNHVIP	National Network of Hospital-Based Violence Intervention Programs
NRC	National Research Council
PHQ-9	Patient Health Questionnaire-9
USPSTF	U.S. Preventive Services Task Force
VA	Department of Veterans Affairs
VHA	Veterans Health Administration

1

Introduction[1]

Firearm injuries and death are a serious public health concern in the United States. Firearm-related injuries account for tens of thousands of premature deaths of adults and children each year and significantly increase the burden of injury and disability. Firearm injuries are also costly to the health system, accounting for nearly $3 billion in emergency department and inpatient care each year.

At the suggestion of officials at Kaiser Permanente, and with the support of both Kaiser Permanente and the American Hospital Association, the Board on Population Health and Public Health Practice of the National Academies of Sciences, Engineering, and Medicine convened a workshop that examined the roles that health systems can play in addressing the epidemic of firearm violence in the United States. The board convened an ad hoc committee and charged it with the following Statement of Task[2]:

> An ad hoc committee will plan a 2-day public workshop that addresses the research needed to enable health care systems to be more effective in

[1] This section is based on the introductory presentations at the workshop. Speaker statements are not endorsed or verified by the National Academies of Sciences, Engineering, and Medicine.

[2] The planning committee's role was limited to planning the workshop, and the Proceedings of a Workshop was prepared by the workshop rapporteurs as a factual summary of what occurred at the workshop. Statements, recommendations, and opinions expressed are those of individual presenters and participants, and are not necessarily endorsed or verified by the National Academies of Sciences, Engineering, and Medicine, and they should not be construed as reflecting any group consensus.

preventing firearm injury and death. The workshop will focus on the evidence and best practices by health systems and health care professionals in preventing gun injuries.

The workshop would include speakers and discussion panels that:

- define the current state of evidence on health care–based interventions
- present current evidence-informed practices from selected health systems
- define foundations for best approaches to disseminate and implement evidence-based practices
- identify community linkages that may help empower health systems to be more effective with interventions
- frame the scope and programming of potential future research that can be carried out by Kaiser Permanente and others to fill identified research gaps

Panel discussions should consider the many facets of the health system[3] that may be touch points for gun injury prevention strategies, such as primary care, specialty care, behavioral health, and emergency departments. Furthermore, prevention strategies to be discussed should include a focus on high-risk individuals who, through a combination of environmental and behavioral risk factors, are at highest risk of a firearm injury or death.

Panel discussions should not focus on regulatory or other public policy approaches or interventions related to firearm sales, manufacture, or ownership of firearms. The workshop will focus on primary prevention and not the acute care or rehabilitation services for firearm injury victims.

The committee will plan and organize the workshop, select and invite speakers and discussants, and moderate the discussions. A proceedings of the presentations and discussions at the workshop will be prepared by a designated rapporteur in accordance with institutional guidelines.

In his introductory remarks to the workshop, Victor Dzau, the National Academy of Medicine president, characterized gun violence as an issue that those involved with the health of the nation must recognize as "a defining public health challenge of our time." He noted that in 2016 firearms had accounted for more than 38,500 deaths and more than 85,000 injuries and that three of the deadliest mass shootings in modern U.S. history occurred in a span of less than 6 months. "These events have only heightened the focus that we all need to have on gun violence and the need to take actions

[3] In the context of the workshop, "health systems" were broadly considered as an organization that consists of at least one hospital and at least one group of physicians that provides comprehensive care, who are connected with each other and with the hospital through common ownership or joint management. See https://www.ahrq.gov/chsp/chsp-reports/resources-for-understanding-health-systems/defining-health-systems.html for more information (accessed December 20, 2018).

to prevent it," said Dzau, who added that it takes a village to solve an issue as complex as firearm violence. "That is where we all come in, because you need everything from prevention to intervention, and you need a range of stakeholders including health providers, health systems, researchers, and policy makers."

Dzau said that in his opinion a multi-sector engagement with a focus on public health and prevention will be critical to reducing firearm injuries and death on a meaningful scale. Achieving that focus will require evidence-based policy to promote public health and prevention. While crafting and enacting such policies will not be easy, he said, evidence-based policies have been effective in reducing motor vehicle injury, tobacco use, drownings, and other causes of injury and death. The challenge with firearm violence, Dzau said, is that the research needed to understand the causes of firearm injury and death and to develop intervention and prevention strategies is currently in short supply.

In 2013, following the Sandy Hook tragedy, President Obama directed the Centers for Disease Control and Prevention (CDC) to mount a research initiative, and CDC in turn requested the Institute of Medicine (IOM), now the Health and Medicine Division, and the National Research Council (NRC) to conduct a study.[4] The resulting report, *Priorities for Research to Reduce the Threat of Firearm-Related Violence* (IOM and NRC, 2013), laid out the priorities for a 3- to 5-year research effort. "And you know what?" Dzau said. "Nothing happened because the politics of the issue have prohibited CDC and others to support research in this area." However, he added, thanks in part to the efforts of members of the committee that authored the IOM and NRC report, the 2018 Omnibus Funding Bill includes explicit language that federal support of research on firearm violence is allowable, which clarified a longstanding misinterpretation of the 1996 Dickey Amendment which was thought to prohibit the federal government from funding such research. "Unfortunately, no money has come this way as of yet, so we need to work harder on this issue," Dzau said.

Health systems, said George Isham, a senior fellow at HealthPartners Institute, can make a difference in preventing gun violence. Health systems, he explained, see millions of patients each year, not just in emergency departments and hospitals but in primary care and specialty practices. Health systems conduct research and engage in quality improvement work to translate research findings into the best possible day-to-day care for people they serve. In addition, there is a strong precedent for health systems

[4] As of March 2016, the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine continues the consensus studies and convening activities previously carried out by the Institute of Medicine (IOM). The IOM name is used to refer to publications issued prior to July 2015.

and the community of health care providers to address issues such as the prevention of firearm injury and death. "Health systems do have a track record in terms of making an impact," Isham said. "They have developed this track record by implementing best practices based on good science, and, as a result, they have had a substantial impact by contributing to many public health issues." As examples, he cited the role that health systems played in reducing tobacco use by including tobacco use as a vital sign and connecting every patient who smoked with advice on quitting, as well as in promoting cancer screening and early detection and childhood immunizations.

On a final note before introducing the first speaker of the day, Isham acknowledged that the controversy surrounding firearms in the United States makes it difficult to have any discussion about firearm violence without evoking strong feelings. However, he added, there is no controversy in what this workshop sought to address. "Trying to figure out the best way to keep people alive and healthy is what health care providers and health care systems do," he said, "and that is what we are here to focus on over the next 2 days."

ORGANIZATION OF THE PROCEEDINGS

The workshop (see Appendix A for the agenda) was organized by an independent planning committee in accordance with the procedures of the National Academies. This publication summarizes the discussions that occurred throughout the workshop and highlights the lessons and practical strategies that were suggested and the opportunities identified by the speakers for preventing firearm injury and death. In accordance with the policies of the National Academies, the workshop did not attempt to establish any conclusions or develop recommendations about needs or future directions, focusing instead on issues identified by the speakers and workshop participants. Furthermore, the organizing committee's role was limited to planning the workshop. This workshop proceedings was prepared by workshop rapporteurs Joe Alper, Melissa French, and Alexis Wojtowicz as a factual summary of what occurred at the workshop.

2

Why Do Health Systems Have a Role?

The reason that health systems should be involved in conducting research on firearm injuries and death and developing intervention and prevention strategies is simple, said Bechara Choucair, a senior vice president and the chief community health officer at Kaiser Permanente. "Every single day in America, health professionals find themselves on the front lines of treating patients injured by firearms," Choucair said. "From our emergency departments and primary care settings to behavioral health and specialty care, there are many touch points where health care systems grapple with firearm-related injuries and death. Supporting these dedicated professionals is the right thing to do for patient care and also for the well-being of the communities we serve."

Kaiser Permanente, he said, will take the same approach to studying firearm injuries as it does with cancer, heart disease, and other leading causes of preventable death in America, drawing on the organization's research expertise, rich data sources, and delivery system environment. He made clear, though, that Kaiser Permanente's commitment to research is not about taking a political position on guns. "It is about how we leverage science and research to guide what we do in our hospitals and our clinics and to solve a public health issue," he said. He added that in 2016 and 2017, Kaiser Permanente physicians and nurses treated more than 11,000 victims of gunshot wounds.

As with other epidemics, firearm violence disproportionately affects specific segments of the population, including children and teens, women, and African Americans. Choucair said that on an average day, seven children and teens are killed by firearms in the United States, and each month,

50 women are shot to death by intimate partners. African American men are 13 times more likely than white men to be shot and killed. "This [disproportionate impact] is a big part of the reasons why in April 2018 Kaiser Permanente announced a $2 million investment in research for firearm-related injury prevention and the formation of a task force to address critical health issues around firearm-related deaths and injuries," he said. Toward that end, he said, it was his hope that the discussions at the workshop would both describe the problem and discuss approaches for solving it. "There is no one magic solution to ending this health epidemic," he said, "but there is a growing appetite to address it, as evidenced by the deep expertise in this room."

According to Elizabeth McGlynn, the vice president of Kaiser Permanente Research and the executive director of the Kaiser Permanente Center for Effectiveness and Safety Research, her organization's geographic reach, which covers eight regions across the United States, will enable it to explore how different approaches work in diverse areas of the country. "In looking at our own statistics, we see considerable variation in the rates of emergency department visits for firearm-related causes," she said. "We can see the relative risks for people of different ages, for men and women, by race and ethnicity, by household income, and within very small geographic areas. Having these baseline statistics will help us set priorities and evaluate the effectiveness of different approaches to prevention." McGlynn added that she and her colleagues are committed to sharing its findings broadly, noting that Kaiser Permanente has a history of working collaboratively with other health systems and, in particular, with the safety net systems that operate in the communities it serves. "We expect there will be considerable interest in the insights from our research and look forward to sharing those results with you and others," she said. "Beyond our own work, we hope to inspire a great many others to step in and fill the gaps in knowledge that exist today. This workshop is one of many steps on the path to filling the gaps in our evidence base, and enhancing our ability to deliver effective care in this area."

GUN VIOLENCE: A COMPLEX BIOPSYCHOSOCIAL DISEASE REQUIRING A STRENGTHENED HEALTH CARE SYSTEM RESPONSE

In the workshop's first presentation, Stephen Hargarten, a professor of emergency medicine, an associate dean for global health, and the director of the Comprehensive Injury Center at the Medical College of Wisconsin, framed gun violence as a complex biopsychosocial disease and defined gun violence prevention as a role that health systems should take as civic leaders of health care. He noted that the prevention of gun violence is at its heart

a scientific issue and that any solution will only come with research and scientific understanding.

Hargarten said that more than 500,000 parasuicides—attempts in self-harm in which death is not the aim—using any method are seen in emergency departments annually along with more than 1.6 million victims of assault. There are individuals in both of these groups who are at risk of dying by suicide once discharged from the hospital, he explained, but little is known about the subtle signs and antecedents that might identify those who are at risk and may benefit from intervention. Gunshot victims are also at risk of themselves becoming perpetrators of violence and shooting someone else. "We need to do—and have an opportunity to do—a better job of identifying those potential victims and screening them appropriately," Hargarten said. He added that aside from the physical and psychological effects of gun-related violence, a recent analysis found that among hospital-treated non-fatal injuries, the most costly to treat are near-drownings, self-harm, and firearm-related violence (Zonfrillo, 2018).

It is clear from looking at a list of antecedents for all manners of homicide and suicide death (see Box 2-1), Hargarten said, that health care systems can play a significant and more effective role in identifying patients

BOX 2-1
Antecedents of Homicide and Suicide Death

- Current depressed mood
- Current diagnosed mental health problem
- Type of mental health diagnosis: identifies the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition*, diagnosis made by a medical or mental health practitioner
- Current mental health treatment
- History of treatment for mental health problem
- Alcohol/other substance problem
- Other addictions
- Family relationship problem
- Other relationship problem
- History of child abuse/neglect
- Caretaker abuse/neglect led to death
- Victim of interpersonal violence in previous month
- Crisis during previous or upcoming 2 weeks
- Other crises

SOURCES: Adapted from a presentation by Stephen Hargarten at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; Jack et al., 2015.

at risk, identifying protective factors, and affecting individuals who may be at risk of a homicide or suicide event in the future. He noted that intimate partner violence accounts for almost half of female homicides and that the U.S. Preventive Services Task Force has issued guidelines on how to screen for intimate partner violence and what steps to take.[1]

The horrific biologic effects of a gunshot wound on the human body result from the transfer of a bullet's kinetic energy to human tissue, Hargarten explained. In many instances, he said, the damage is so severe that victims will experience lifelong disability, but in some instances the resulting injury can be subtle and only appear later. In one example, a gunshot victim suffered an occult fracture of the femur that was not diagnosed until 2 weeks after the patient was treated initially. In that case, Hargarten said, "we did not prevent additional disability for this patient because we did not understand the dynamics of this disease process." The lifetime of disability that often results from a gunshot wound and the relative brevity of the pathophysiology of this disease argues for primary prevention as a major thrust for action, he added.

Hargarten said that he sees firearm violence as a complex biopsychosocial disease and believes that, as such, it needs to be studied and treated as a disease. In this case, the disease framework would define the disease agents as the kinetic energy imparted by a bullet; the vector of disease as a gun; and the environment in which the disease occurs as homes, parks, streets, schools, and workplaces; while the high-risk groups of this disease would include young African American men, middle-aged women, and older white men. Framing firearm violence as a disease, one with a social context and psychological antecedents, pulls in other professions to address its causes and symptoms, Hargarten observed. It also broadens the outcome goals for treating violent injury to include psychosocial health and well-being (Monopoli et al., 2018). In short, Hargarten said that he considers firearm violence to be a disease of the 21st century, just as the National Academies identified injury resulting in accidental death and disability as a neglected disease of modern society more than 50 years ago (NAS and NRC, 1966).

The primary prevention challenge for a health systems approach to reducing gun violence is to be more effective at conducting behavioral health screenings, including for adverse childhood events and for any social determinants that raise the risk of experiencing violence, across all sectors of the system. In addition, he said, health systems will need to strengthen secondary prevention by broadening the expertise of the teams caring

[1] See https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/intimate-partner-violence-and-abuse-of-elderly-and-vulnerable-adults-screening (accessed December 20, 2018).

for patients and tertiary prevention by committing over the long term to addressing community health as a means of reducing readmissions, complications, and recidivism. "This is a framework for us to understand where health care systems can play an effective role by focusing on patients as we do for other disease processes," Hargarten said.

The case for preventing gun violence is unique to gun violence, he said, because it has the highest case fatality ratio for both suicide and homicide and the exposure to the disease agent—the kinetic energy imparted by the bullet—is so brief that there are no opportunities for acute intervention during that moment of energy release (Hargarten et al., 2018). "We pick up the pieces in trauma centers with trauma surgeons and others who effectively stop the bleeding and biologically treat the patient, but we have other opportunities to do a better job," he said. "Broadening the biomedical model to a psychosocial model strengthens the care of our patients." He noted that surgeons have started selecting patients for a variety of surgical procedures, such as hip replacements, based on their behavioral and social determinants because outcomes differ, which suggests that a biopsychological approach to disease is starting to permeate the U.S. health care system in general; such an approach should strengthen care, lower costs, improve quality of life, and allow health care systems to focus their strategies on prevention, he said.

One advantage of framing gun violence as a complex biopsychosocial disease is that allows research and care to be driven by science and to consider a gunshot wound as a sterile injury with complex pre- and post-psychosocial elements. "It pulls us in as health care system leaders, it informs and focuses the management of patients, and it prioritizes primary prevention because of the high case fatality ratios," Hargarten said. "And [this framing] offers a paradigm shift for research support." He credited Kaiser Permanente with leading the effort to understand gun violence through research, citing its March 2018 announcement that it was allocating $2 million to fund research on the subject. He then quoted Kaiser executive Bechara Choucair, who said, "Going forward, we will study interventions to prevent gun injuries the same way we study cancer, heart disease, and other leading causes of preventable death in America. The best-in-class preventive and specialized care Kaiser Permanente provides is accomplished, in part, by using rigorous research, without bias, to determine which strategies are effective."

Advancing injury science in health care systems for improved outcomes has led to a greater involvement of health care systems in the prevention of falls, suicide, domestic violence, tetanus, and at-risk alcohol use and abuse, Hargarten said. As an example, he recounted how on a recent trip to a dermatologist for a routine skin check, the first thing he was asked was if he had fallen in the past 30 days. At first, he thought that that question

was odd, given the setting, but he then realized that it is expected of health care systems today to be involved in falls prevention. He did note, though, that training health care professionals on how to screen for dangers such as a risk for domestic violence has to improve.

In closing, Hargarten quoted Albert Einstein, who said, "The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking." His point was that society must rethink gun violence. "We must move away from political and social debates to constructive discussions to advance complex biopsychosocial disease management and prevention, supporting research all along the way, just like we do for other diseases," he said.

3

The Toll on Individuals and Communities

The workshop's first panel session included two presentations on the toll that firearm violence takes on individuals and communities. Lucas Neff, an assistant professor of pediatric surgery at the Wake Forest University Baptist Medical Center, discussed a case study to illustrate some of the points where a health system could have intervened before the injury occurred. Therese Richmond, the Andrea B. Laporte Professor and associate dean for research and innovation at the University of Pennsylvania School of Nursing and the Penn Injury Science Center, spoke about the psychological and social burdens of firearm violence on communities. A moderated question-and-answer session led by George Isham followed the two presentations.

A PEDIATRIC VICTIM AND OPPORTUNITIES THE HEALTH SYSTEM HAD TO INTERVENE

One of the things that strikes him as a pediatric surgeon, Neff said, is the unprecedented number of pediatric firearm injuries that have occurred over the past 18 months and the fact that he is in the same situation as a pediatric surgeon today as he was when he was a general surgeon in the Air Force, where he had to react to events rather than anticipate and help prevent them. Prevention was not possible in Afghanistan, of course, but Neff said that he and his colleagues felt the same sort of powerlessness in Atlanta where he was completing his pediatric surgery fellowship after leaving the Air Force as he had felt in Afghanistan.

Neff mentioned that C. Everett Koop, the Surgeon General in the Reagan administration, once said that if diseases were killing children at the

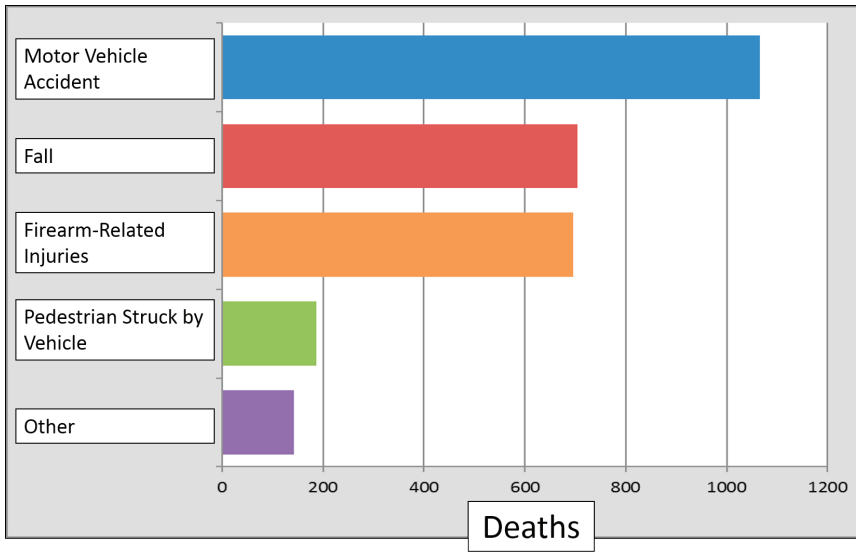

FIGURE 3-1 Leading causes of pediatric deaths in trauma centers in the United States (2010–2016).
NOTES: Firearms accounted for more than 25 percent of all pediatric deaths reported in trauma centers in this period. This presentation used the American College of Surgeons definition of pediatric as aged 0–19. See https://www.facs.org/quality-programs/trauma/tqp/center-programs/ntdb/docpub for more information (accessed December 27, 2018).
SOURCES: Adapted from a presentation by Lucas Neff at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; ACS, 2019.

same rate as injuries and firearms, the American people would be outraged and demand action.[1] Pediatric[2] traumas are the leading killer of children in the United States, with firearm violence being the third-leading cause of pediatric deaths (see Figure 3-1). However, when viewed in terms of case fatality rate, firearms are the most lethal (see Figure 3-2). The causes of firearm-related injuries to children include accidental shootings and discharges of weapons that children find unsecured, self-harm among teenagers and young adults, and intentional violence.

Turning to his case study, Neff described Chazmin, a 16-year-old African American girl for whom he cared during his pediatric surgery fellow-

[1] See http://www.cnn.com/TRANSCRIPTS/0105/03/se.01.html for full quote (accessed December 20, 2018).

[2] This presentation used the American College of Surgeons definition of pediatric as aged 0–19. For more information, see https://www.facs.org/quality-programs/trauma/tqp/center-programs/ntdb/docpub (accessed December 27, 2018).

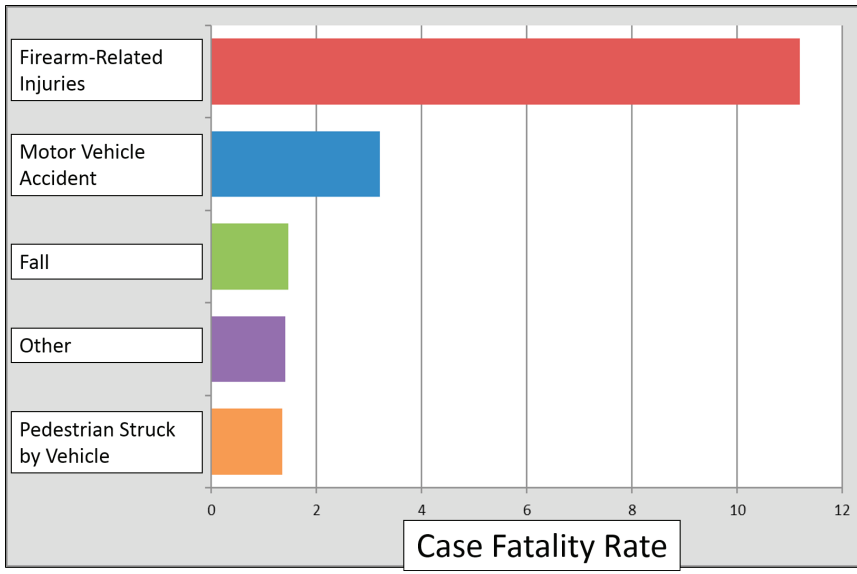

FIGURE 3-2 Pediatric trauma case fatality rate in trauma centers in the United States (2010–2016).
SOURCES: Adapted from a presentation by Lucas Neff at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; ACS, 2019.

ship and who gave him permission to tell her story at the workshop. At the age of 6 months, her parents were killed by a firearm during a home invasion while she slept in the room next door. From that point, her grandmother raised her in East Atlanta, an area with an above-average crime rate and nightly reports of gunshots. Chazmin also has family members involved in gang activities, but there are no firearms in her home.

Based solely on her age and race, Chazmin has an above-average risk of being injured by a firearm (see Figure 3-3). Her risk was further elevated because of a family history of violence (which was triggering disturbing flashbacks), the neighborhood in which she lives, and mental health issues including behavior problems at home and school and having suicidal ideation. Given those risk factors, Neff said, he wondered where the best opportunities to intervene in Chazmin's life would have been before she was shot when a vehicle pulled up to the car in which she was riding and emptied 20 rounds into the automobile. Of the five or six people in the car, she was the only one hit—a bullet severed her spine and produced multiple injuries in her abdomen.

Chazmin spent roughly 3 months in the hospital and acute inpatient rehabilitation facility recovering from her injuries, during which time she

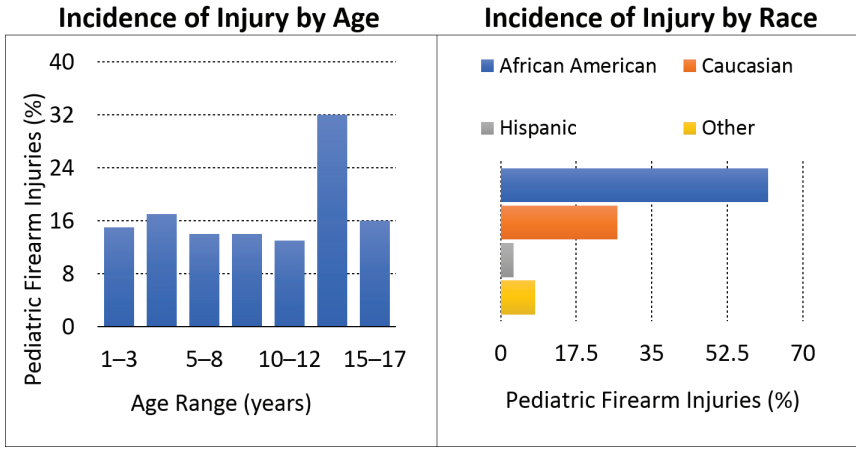

FIGURE 3-3 Pediatric firearm injury data from Atlanta by age and race (2005–2015). SOURCE: Adapted from a presentation by Lucas Neff at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; ACS, 2019.

had multiple additional encounters with the health care system to deal with various issues related to her injuries. She will be a paraplegic for the rest of her life, and now her grandmother has to carry her to their second floor apartment or else she has to have her grandmother lift her out of her chair and then scoot up the stairs herself.

In talking with Chazmin and her caregivers, Neff said, he found that she did go to annual visits with her pediatrician and that her family had filled out an intake form asking about the availability of firearms in her home. She also had intermittent visits at the local children's hospital for asthma exacerbations. While those routine checklist items were being done with a fair degree of fidelity, he said, routine screening did not translate into action in the form of violence prevention campaigns in her community.

In closing, Neff acknowledged that prevention is difficult and requires sustained effort. The goal, he said, should be to move from a reactionary model of health care to a more preventive one. "I am hoping we can unlock the needed research and advocacy and move forward," Neff said, "and in spite of the complexity and the seemingly insurmountable task ahead of us, it is my hope we can draw inspiration from people like Chazmin and from each other and continue to foster a sense of urgency in preventing firearm-related injury in our country."

THE PSYCHOLOGICAL AND SOCIAL BURDEN OF FIREARM VIOLENCE ON COMMUNITIES

Firearm violence is a determinant of the health and well-being of individuals, communities, society as a whole, and health care systems, Richmond told the workshop. Firearm violence is inextricably tied to race and inequity, poverty and poor housing, limited access to healthy food and educational opportunities, and a lack of safe places to work, live, play, walk, and socialize. "All of these factors directly impact health," she said, "so if we want healthy people in our communities and in our health care systems, we must address firearm violence."

Richmond said that firearm violence affects everyone and that it is important to get that message across because, as she put it, "if we do not believe it is our problem, we have no incentive to solve the problem. That is true individually and for families, and it is certainly true for health systems." To illustrate this point, she cited data from a study she and her colleagues did showing that firearm violence is not solely an urban problem (Branas et al., 2004) (see Figure 3-4). The data show that while firearm homicides are more common in urban than rural areas, the reverse

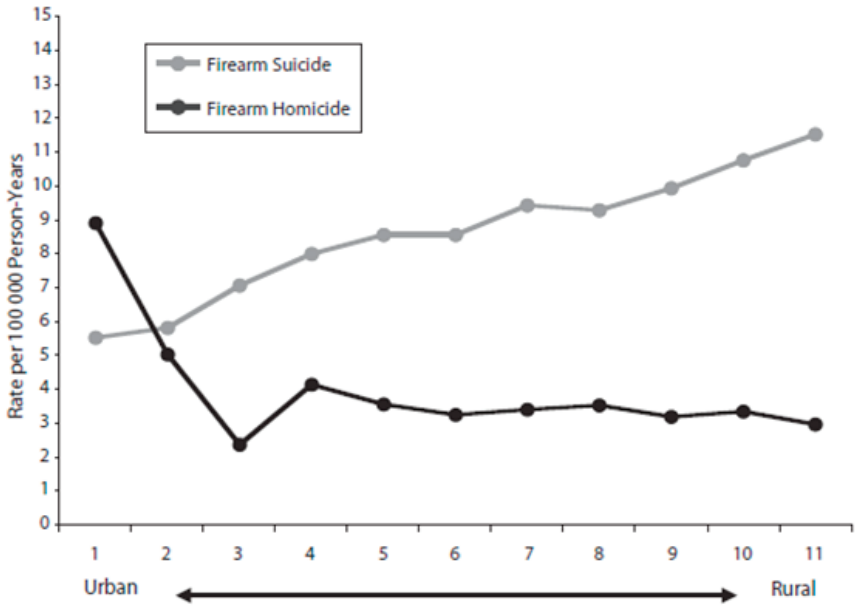

FIGURE 3-4 Urban and rural shifts in intentional firearm deaths.
SOURCES: As presented by Therese Richmond at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; Branas et al., 2004.

is true for suicide by firearm. Multiple regression analysis demonstrated that firearm violence is everybody's problem when homicide and suicide are combined. Further supporting this idea is a social network analysis that makes the case that almost everybody at some point in their lives has somebody in their social network who is affected by gun violence (Kalesan et al., 2016) (see Table 3-1).

Richmond stressed that it is important from a differential diagnosis perspective to know the burden of firearm violence in one's own health care system. "If I do not correctly diagnose the problem," she said, "it does not matter what intervention I am giving, because it is not really going to take care of the problem."

To drive home this point, she referred to a study that she and her colleagues conducted in the early 2000s (Richmond et al., 2004). This study looked at three small- to medium-sized cities in Iowa, Ohio, and Pennsylvania with trauma centers that served as hubs for treating firearm injuries. The city in Pennsylvania thought of itself as a "gun-toting" community and was not eager to have Richmond and her colleagues looking at the burden of firearm violence there, but it wanted to use those data to secure law enforcement money to address a gun homicide problem that the community blamed on drug traffickers from New York traveling south through the community. However, after gathering data from every source possible—this was before the National Violent Death Reporting System existed—Richmond found that the real burden on the community was not homicide but firearm-related suicide, particularly among older white men (see Table 3-2). In the first meeting with the community, she recalled, the response to this information was largely apathetic. Though she protested that, as a nurse, she could not find this to be acceptable, the community did not feel that firearm-related suicides were a problem that needed solving.

Analyzing the narrative notes, suicide notes, and medical examiner notes, Richmond's team found that the main reason for suicide was not that these older men were in a terminal state but rather they were afraid of being a burden, were in unremitting pain, had depression, or were socially isolated. Using this information, her team was able to mobilize the community to address these solvable issues.

Richmond then discussed the burden borne by people injured by firearms, which she believes health systems do not adequately address. In a subset of a large cohort study of 623 seriously injured African American men, 55 percent of whom were violently injured, many by firearms (Jiang et al., 2018), it was clear that these men were suffering several psychological problems as a result of having been shot. "The psychological outcomes are profound, and I would posit that as trauma centers and health care systems, we are not dealing with this within our own systems in an optimal way that I believe we can," Richmond said. The reason to care about that fallout, she

TABLE 3-1 Likelihood of Gun Violence in a Person's Social Network, 2013

Group	GV Rate[a]	SN no GV in 1 Year[b] (range)	SN no GV in a Lifetime[c] (range)	SN GV in a Lifetime[d] (range)
Overall	37.2×10^{-5}	0.90 (0.90–0.89)	1.5×10^{-3} (2.4×10^{-3}–0.9×10^{-3})	99.8% (99.8–99.9%)
Non-Hispanic whites	20.3×10^{-5}	0.94 (0.95–0.94)	29.0×10^{-3} (37.3×10^{-3}–22.4×10^{-3})	97.1% (96.3–97.8%)
Blacks	86.6×10^{-5}	0.78 (0.79–0.76)	2.7×10^{-7} (8.03×10^{-7}–9.04×10^{-8})	99.9% (99.9–99.9%)
Hispanics	30.2×10^{-5}	0.92 (0.92–0.91)	5.1×10^{-3} (7.5×10^{-3}–3.5×10^{-3})	99.5% (99.3–99.6%)
Other race	12.6×10^{-5}	0.96 (0.97–0.96)	11.1×10^{-2} (13.0×10^{-2}–9.5×10^{-2})	88.9% (87.0–90.6%)

NOTE: GV = gun violence; SN = social network.

[a] Proportion of those who are gun violence victims (both fatal and non-fatal) in the specific population.

[b] Probability of having no one with gun violence in SN is calculated using (1 – rate of fatal and non-fatal gun injuries)^{291}. Range indicates the range of social network size between 270 and 312.

[c] Probability of no one with gun violence in SN in a lifetime: Kalesan et al. assumed first 60 years to be the time period a person develops his or her personal SN. Kalesan et al. calculated using the formula $100 * ((1 - \text{rate of fatal and non-fatal gun injuries})^{291})^{60}$.

[d] Having a gun violence victim in SN in a lifetime was calculated using the formula $1 - (100 * ((1 - \text{rate of fatal and non-fatal gun injuries})^{291})^{60})$.

SOURCES: Adapted from a presentation by Therese Richmond at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; Kalesan et al., 2016.

TABLE 3-2 Firearm-Related Homicides and Suicides per 100,000 Individuals in Three Communities

		Homicide			Suicide		
		PA *n* = 56	OH *n* = 304	IA *n* = 45	PA *n* = 189	OH *n* = 160	IA *n* = 280
Death rate per 100,000		2.02	12.50	1.08	6.82	6.58	6.72
Race	White	1.36	2.92	0.84	6.96	6.80	6.80
	Black	15.9	77.48	10.80	2.64	5.42	3.92
Gender	Male	3.26	21.86	1.58	12.24	11.90	13.16
	Female	0.70	3.46	0.68	1.46	1.66	1.06
Ratio of firearm deaths to intentional deaths by other means		67%	92%	61%	50%	55%	52%

NOTE: IA = Iowa; OH = Ohio; PA = Pennsylvania.
SOURCES: Adapted from a presentation by Therese Richmond at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; Richmond et al., 2004.

said, is that the victims are likely to experience the symptoms of traumatic stress, use illicit substances, be reinjured by other violent encounters, and become perpetrators of gun violence themselves (Rich and Grey, 2005) (see Figure 3-5). "If we are looking for a point of intervention," she said, "this population with unmet psychological needs after their first injury are targets for intervention that we should take very seriously." In short, she said, those injured by firearm violence are more likely to have interactions with the criminal justice system than with the health care system, when their core need is health.

One of the surprise findings from her study, she said, was that the number one reason the men who participated in the study—men who are difficult to recruit and retain—gave for doing so was human connection. "Clearly, there is evidence that we can up our game when we think about the psychological and social burdens of [firearm violence]," Richmond said. One challenge, though, is that psychological responses to trauma often arise after people are discharged and they may not know how to recognize the symptoms and get the help they need. Even when these men knew they needed help, they experienced a number of barriers to getting care, including a fear of judgement, limited access to mental health services, social and cultural barriers, and a belief that professional help would be ineffective (Jacoby et al., 2018b). Richmond said that she believes that breaking down silos is key to addressing this problem. "We are remiss

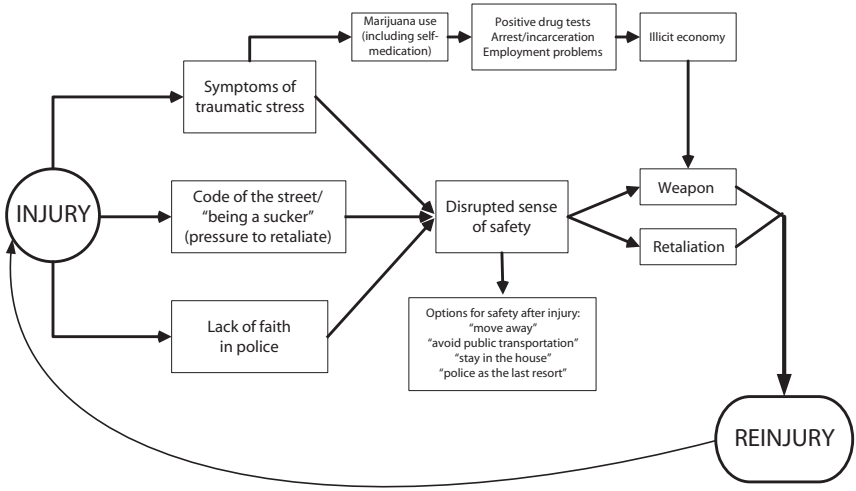

FIGURE 3-5 Pathways to recurrent trauma among young African American men.
SOURCES: As presented by Therese Richmond at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; Rich and Grey, 2005.

if we do not address acute psychological responses with the same steely resolve that we address airway, breathing, and circulation. No longer can psychological assessment be viewed as a nice add-on," she said, referencing a commentary she had written for the *Journal of Trauma* (Richmond, 2005). "It must be integrated into the very essence of trauma care if we are to improve the outcomes of survivors of serious injury."

Richmond said that for her, the reasons the health care system needs to address firearm violence are personal. "If you live in a community with pervasive violence and firearm violence, you are likely to have significant health effects because of that," she said. "The burden is not just when you are physically injured." There is also an economic burden, for instance (Peek-Asa et al., 2017), as well as a negative effect on the well-being of children. In a survey of children in west and southwest Philadelphia, Richmond and her colleagues found that 95 percent had heard about violence in the community, 87 percent had witnessed it, and 54 percent were victimized themselves (McDonald et al., 2011). Constant vigilance among the youth in these neighborhoods was the predominant strategy for coping with the stress of living in violent communities, she said (Teitelman et al., 2010). Living in a violent community, Richmond said, increases the risk of children and adolescents becoming violent offenders (Nofziger and Kurtz, 2005), experiencing increased depression, suicidal ideation, and suicide attempts (Lambert et al., 2008), and achieving poorer academic performance and having shorter telomere lengths and increased allostatic load (Theall et al., 2017).

In her opinion, Richmond said, health systems have the opportunity to work with communities to change neighborhoods one block at a time, to improve people's health, and to reduce firearm violence (Tach et al., 2016). Given that the burden that firearm violence lies at the doorstep of the nation's health care system, taking that opportunity makes sense, she said. Her hospital, for example, has a dedicated trauma resuscitation area to care for gunshot victims. She noted that while the nation is paying attention to mass shootings—and she said that she in no way wanted to minimize the negative effect of mass shootings—the equivalent of mass shootings takes place every day, one shooting at a time. In the same 24 hours of the high school shooting that took 17 lives in Parkland, Florida, in February 2018, her hospital had two trauma alerts and treated six gunshot victims. Richmond also said that because police in Philadelphia often deliver patients with gunshot wounds directly to the emergency department, they are provided entrance into the health care space. While physicians and nurses are focused on treating the patients, law enforcement may concurrently be attempting to question shooting victims. The dynamic of this brings to the forefront the intersection between health care, law enforcement, and race (Jacoby et al., 2018c), requiring health systems to carefully

consider the need to develop policies guiding this intersection in order to make patient health and patients' rights the top priorities.

DISCUSSION

The discussion session began with Lih Young, who did not provide her affiliation, commenting that unless the nation deals with the social determinants of health, there will be no solution to firearm violence. Richmond and Hargarten agreed that this is an important societal issue but also that it is one that may be beyond the scope of health systems to address on their own. Hargarten added that there is now a section in the American College of Emergency Physicians on social emergency medicine that is dedicated to being better at addressing the social determinants that are evident, or perhaps not so evident, when a patient comes into the emergency department. This section is also working with health system leaders on this problem. In his opinion, he said, the biopsychosocial model pulls the health care community together to consider the social determinants as part of a continuum rather than as an add-on concern.

David Grossman from Kaiser Permanente commented that while primary prevention should be a top priority for health systems, so too should secondary prevention aimed at those individuals who have already been injured by a firearm. As an example, he pointed out that the reason patients are asked about recent falls is that it is the best predictor of future falls and, that since it is difficult to do primary prevention around falls, given the lack of good screening tools, health systems focus on secondary prevention. Hargarten replied that there is no question that the effectiveness of secondary prevention is paramount with firearm violence and that health systems need to do a better job at secondary prevention when any form of violence is involved. That said, he added, primary prevention is also critical, given the high fatality rate of suicide by firearm and the lethality of gunshot wounds in general.

Neff said that secondary prevention needs to extend beyond the individual to the entire family, particularly when the patient being discharged was the victim of an accidental firearm discharge in the home. In his experience, he said, the attitudes and perceptions about firearm safety may not change much despite the occurrence of what he referred to as a "seminal event" in the life of the family. He also said that while pediatricians now ask parents about car seats and water temperature in the home, it is almost taboo to ask about firearm access in the home. However, he added, research in Atlanta has shown that people respond well when health systems engage with the community and frame the issue of firearm violence as a disease process.

Richmond said that dealing with the psychological sequelae of violence—as well as of the trauma that people experience throughout their

lives—is an important component of secondary prevention that health systems can address now. "We should probably be thinking about infusing trauma-informed care throughout the health system," she said. While Carnell Cooper from Northeast Methodist Hospital in San Antonio, Texas, said he agreed with Richmond, he noted that there is a nationwide shortage of behavioral health specialists. One way of dealing with the problem that Cooper raised would be by breaking down the silos in health care, he suggested. At Froedtert Hospital's Level 1 Trauma Center, for example, clinical psychologists are embedded in other practices, including the trauma surgery unit.

A second approach, which Hargarten said his psychiatry colleagues are taking, is to accept that other health care professionals, such as psychiatric nurse practitioners, psychiatric social workers, and clinical psychologists, work with these patients and thus that they should be embedded in the system of care rather than remain siloed in a mental health clinic. "We have got to do a better job of integrating behavioral health services and integration our approach to taking care of patients," Hargarten said. "We have pharmacists in our emergency department, so why not a clinical psychologist helping us manage these patients with complex behavioral health issues?" There would be financial issues to address, he acknowledged, but if reimbursement is now available for screening in the emergency department for at-risk alcohol use and abuse, it should be feasible to make an economic argument that screening for risk of firearm violence—as well as other approaches to prevention—should be reimbursed as an important service.

Isham asked the panelists if they believe that their health systems do not place as much value on prevention as they should. Richmond said she would not presume to speak for her institution, but she did say that health care systems have a long way to go in terms of breaking down silos and integrating behavioral health. To her, she said, the available data speak loudly to the fact that not meeting behavioral health needs puts people at risk and costs health systems more money in the long term. Neff agreed that this is not a high priority in the health systems he has worked for over his career. "I will say that framing it in the biological terms, as Dr. Hargarten has done, and very much as an epidemiology and public health issue and removing all pretext of politics or large macro-level policy issues from this discussion potentially could go a long way in getting the C-suite [organizational leadership] to buy into it," he said. One hopeful development, Hargarten said, is the trend for health care systems to partner with public health agencies and to think more broadly about the population health that the Patient Protection and Affordable Care Act (ACA) promoted.

Isham said that despite having a long history as a medical director and chief health officer, he was unaware of the magnitude of firearm injury and death, which, he said, underlines the challenge of raising awareness

about this issue across health care professions. His question for Richmond was whether having community-specific data or institution-specific data could raise awareness and prompt action. Yes, Richmond said, saying that was in fact the case with health systems in the three communities she studied and referred to in her presentation.

One thing that Richmond said she has observed is that firearm suicide has such a high case fatality rate that clinicians do not see many victims in the health system and as a result do not realize how important of an issue it can be. She also commented that it is now much easier for health systems and communities to get data because of the National Violent Death Reporting System and other sources of data on deaths. Hargarten commented that he is engaged in a project to get health systems to adopt the Cardiff Violence Prevention Model[3] (Florence et al., 2011, 2014) into emergency departments and that he is working with public health and community groups to better understand the patterns of violence that occur in a community. In his experience, he said, it has been fairly easy to get emergency department staff to ask where a person was shot and to enter de-identified data into a system for the community to use. "I think this is a great example of how health care systems can engage meaningfully in the community," Hargarten said. In fact, he said, the health system where he practices is creating, in partnership with law enforcement, what is essentially an atlas of violence for the community it serves. Such a partnership is proving important, he said, because not all cases are known to the police and the atlas allows law enforcement and public health to be more proactive, not just reactionary, in efforts to address violent injuries in a community setting.

Viviana Goldenberg from Kaiser Permanente asked the panelists about the role that primary care providers can play in screening individuals who have no previous history of diagnosed mental illness—and thus who cannot legally be restricted from access to firearms. Hargarten replied that research is needed to better understand and identify who is at risk of committing firearm-related violence. Such research, he said, should look at individuals starting in childhood because the risk of committing firearm-related violence changes as individuals age, with the risk first becoming apparent at around age 14 and peaking between ages 21 and 24, regardless of where one lives. The National Academies' Forum on Global Violence Prevention is exploring this issue, he noted. Neff said that health systems should empower their primary care providers to "get in the weeds" with some of these issues of risk identification and should provide these clinicians with the resources and mechanisms to act on a hunch that could save lives.

[3] For an overview of the Cardiff Violence Prevention Model (Cardiff model), see https://www.cdc.gov/violenceprevention/fundedprograms/cardiffmodel/whatis.html (accessed December 27, 2018).

Richmond added that work is needed, too, to determine how best to create the conversations that can identify risk, which Isham pointed out has been done with tobacco interventions and pediatric immunizations. Betty Lee Davis, a clinical social worker from the Philadelphia area, suggested that one potential risk factor that could be looked for is a history of exposure to or committing violence, a suggestion that Richmond and Neff supported.

Aerielle Matsangos from the Coalition to Stop Gun Violence asked the panelists if they could recommend how to communicate and work with police officers in emergency situations involving firearms. Hargarten replied that he and his colleagues are piloting a program based on the Cardiff model for collecting data and collaborating with law enforcement and the public to predict and prevent violence, and he said that he sees this as a means of bringing together sectors of civil society to talk about how to make communities healthier and safer. He added that the increasingly common collaborations among law enforcement, emergency medical services, and health care systems to provide better and more immediate care for opioid overdose patients could be an example of a partnering with police to address a public health problem. Richmond agreed with Hargarten regarding the need to "broaden the team" that health systems interact with to prevent gun violence. She noted, though, that work is needed to resolve how to manage interactions among the police, emergency department staff, and gunshot victims in the emergency department.

An unidentified online participant commented that providers are not well-compensated for preventive services, while health departments have prevention in their purview, and asked how health systems can partner with public health to address gun violence. Hargarten once again mentioned the Cardiff model as an example of an effective partnership, adding that provisions in the ACA have prompted public health and health care systems to partner on community assessments. Now, he said, research is needed to develop effective approaches for translating the findings from a community assessment into programs that will affect outcomes at the population level, something health systems have not been good at to this point. Neff noted, however, that language added at the last minute to the Affordable Care Act prohibits public health systems from asking specifically about firearm ownership or enrolling people in firearm safety programs.

Linnea Ashley from Youth ALIVE! in Oakland, California, who is also a steering committee member for the National Network of Hospital-Based Violence Intervention Programs, asked the panelists for ideas to help encourage hospitals and health systems to be open to community expertise that is not necessarily credentialed in the conventional sense but that can connect health systems to people who have been affected by gun violence and also to the community in general. Hargarten said such that expertise can play a critical role in enacting a violence prevention strategy, and again

he referred to the Cardiff model as an example of how the community takes the lead in preventing gun violence, with health care systems providing information to drive community decision making. "Community engagement is so important and has to be genuine in its scope and nature," Hargarten said.

Anna Cupito from the National Academies asked how the issue of health disparity plays into the discussion of gun violence and if the panelists had any thoughts on how to discuss social determinants of health in a way that includes interventions on gun violence. Richmond replied that since firearm violence is a determinant of health and because social determinants play a role in firearm violence, it is essential to incorporate social determinants of health into any discussion on gun violence. She cited a 2018 study (Jacoby et al., 2018a) that showed that Philadelphia neighborhoods redlined for mortgages in the 1930s are those that sit at the epicenter of firearm violence today. "I think it is inherent on health care systems to look upstream, because our patients live upstream and are affected by those upstream things," Richmond said. She noted that one of the major emphases of Healthy People 2030 is upstream social determinants as drivers of health.

Hargarten asked if it would be possible for the electronic health record to pop up a social determinant risk assessment or behavioral risk assessment for a patient based on some composite score based on where the person lives and the person's history and health conditions. Given that there are such algorithms for determining who is at risk of a heart attack or a stroke, Hargarten said he sees no reason that the same things could not be done for the risk of injuries and gun violence. Isham agreed with Hargarten and said that his sense is that the contemporary health system does not collect the kind of information it will need routinely, including on social determinants, to be effective in helping promote the health and good health care of the people that it will serve in the future.

4

Identifying Individuals at Higher Risk for Firearm Violence

The workshop's second panel featured three short presentations on approaches for identifying those individuals most at risk of experiencing firearm violence. The three speakers were Megan H. Bair-Merritt, the executive director of the Center for the Urban Child and Healthy Family, an associate professor of pediatrics and the associate division chief of general pediatrics at Boston Medical Center; Christopher Barsotti, the chief executive officer of the American Foundation for Firearm Injury Reduction in Medicine (AFFIRM) and the chair of the Trauma and Injury Prevention Section of the American College of Emergency Physicians; and David C. Grossman, the senior associate medical director for market strategy and public policy and a senior investigator at Kaiser Permanente's KPWA Health Research Institute. An open discussion moderated by Therese Richmond followed the three presentations.

Before introducing the first speaker, Richmond presented a visual representation of the Haddon Matrix (Runyan, 1998; Short, 1999), a framework for preventing injuries that looks at factors related to personal, vector, and environmental attributes that can contribute to injury (see Figure 4-1). This illustration, she said, indicates that three things—a potential victim, a firearm, and a potential instigator—have to come together for a firearm injury or death to occur. It also underlines the importance of looking for environmental factors that might be modifiable and offer opportunities for intervention. "As we think about keeping this injury event from happening," Richmond said, "we can think about the three paths into an injury. We can think about the environment in which the injury occurs, and we can think about it in terms of both risk identification or identifying higher-risk

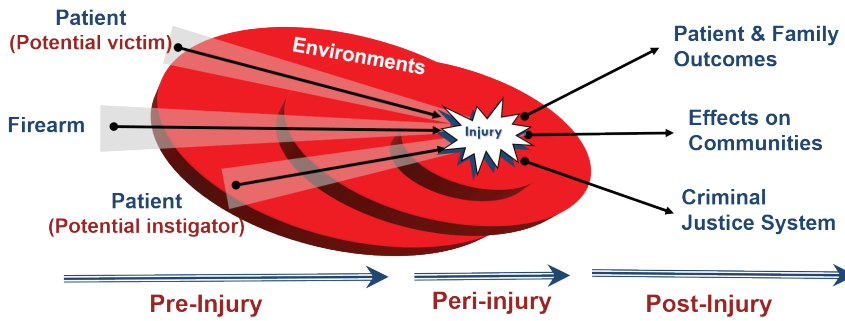

FIGURE 4-1 Haddon Matrix applied to firearm violence.
SOURCE: As presented by Therese Richmond at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018.

situations or patients, and also as protective factors, because everybody has both. If we have lots of protective factors, we may change our risk stratification of individual patients."

IDENTIFYING SURVIVORS OF DOMESTIC VIOLENCE WHO ARE AT HIGH RISK FOR FIREARM-RELATED VIOLENCE

Bair-Merritt said that within the larger field of domestic violence, the research on domestic violence and firearms has, for the most part, taken place separately from research on identifying domestic violence and health system response. What is known, she said, is that 44 percent of female homicide victims are killed by an intimate partner and half of those incidents involved a firearm (Petrosky et al., 2017). She said that having a firearm in the home increases the odds of a survivor of domestic violence being shot by a factor of seven. Other important risk factors include women's assessment of their own risk and worries about escalating violence and a prior history of choking and strangulation. "This is predictive of future death and morbidity," Bair-Merritt said, "and so this is something we have to really listen and pay attention to." She also commented that most of the literature on identifying survivors of domestic violence who may be at risk comes from the Danger Assessment instrument developed by Jacquelyn Campbell at Johns Hopkins University (Campbell et al., 2009; Messing et al., 2017; Snider et al., 2009), which has mostly been used by law enforcement to assess future risk. The original instrument has been scaled down to a five-item instrument for use in an emergency setting.

Bair-Merritt remarked that when she first started working on identifying intimate partner violence (IPV) in a health care setting, the general

response was that it was a social work problem, not a medicine problem. Today, screening for IPV has become a U.S. Preventive Services Task Force (USPSTF) level B recommendation, but the focus is on identifying survivors, and the response tends to be educational. "We have not done good work in thinking about risk stratification and thinking about different interventions based on the situation that the survivor is presenting with," Bair-Merritt said. "So how do we partner with law enforcement and our domestic violence advocates to have a better response?" In her opinion, she said, speaking as a pediatrician, she believes that health care needs to think more about what its response should be when children are in homes with IPV, given the future risk for violence those children may face as a result of IPV exposure.

APPLYING A MEDICAL MODEL OF DISEASE TO IDENTIFY THOSE AT RISK OF FIREARM VIOLENCE

Barsotti said that his interest in identifying those at risk of firearm violence arose from his experience working at a rural level 3 trauma center, where he and his partners had intervened in cases where they thought there was a chance of mass violence, suicide, or IPV. "We keep getting these cases, and we need guidance as community practice physicians," he said, "so I decided I would try to find out what could be done to advise us in practice to identify and treat high-risk individuals, and I realized, in fact, that there is no guidance." Getting such guidance, he concluded, would require research, but there was little research money available for this type of work. Barsotti's response was to join forces with Megan Ranney and form AFFIRM, a nonprofit organization that aggregates money from private-sector sources and uses those funds to support research by medical societies and medical professionals.

He said that his training in emergency medicine on gun violence called for treating the victim, period. In the same vein, data collection was mostly about measuring the first-year costs associated with gunshot wounds and emergency department visits, with no reporting about the collateral, long-term costs that can result from gunshot wounds, such as the need for lifetime colostomy care or dealing with a spinal cord injury for the following decades. Little if any attention was paid to secondary victims, including those who witnessed violence and even those who treated the victims of firearm violence. "After shootings, I take care of my colleagues," Barsotti said. "I take care of nurses and paramedics traumatized by treating victims of gun violence."

In his view, he said, the opportunity for primary prevention is always present. "When we apply the medical model of disease to this problem, I can look at it like any other health problem that has a natural history because I am seeing these patients when they first express the risk factors or

when risk factors escalate, and if we are able to intervene effectively, then we can prevent the shootings." He said that it is his hope that, moving forward, research can define the points of contact for physicians working in clinics and emergency departments so they can identify those individuals who have a latent risk and are having their first expression of that risk. The goal then would be to prevent that risk from escalating and, if that does not work and a shooting occurs, to have an opportunity to mitigate the secondary effects of gun violence to prevent further shootings.

FACTORS TO CONSIDER WHEN THINKING ABOUT IDENTIFYING RISK OF FIREARM VIOLENCE

Grossman made six points relevant to identifying those at risk of firearm violence. The first was that it is imperative to understand how to intervene with gun injury and death at the right time, in the right place, and with the right people. "Timing and place are critically important as we think about how to identify risk and mitigation opportunities," Grossman said. His second point was that firearms are likely to be a permanent part of the U.S. societal environment, which has the effect of fixing one variable in the Haddon Matrix that is foundational to the science of injury control. Third, firearm injury is still a relatively rare occurrence in absolute terms, which means that identifying those at risk is a little like finding a needle in a haystack. "It makes discrimination in the science of risk prediction more complicated than perhaps for more common causes of mortality," he said.

Grossman's fourth point was that targeted interventions make sense to the extent that there is a good understanding of who should receive an intervention, and his fifth point was that the assessment and intervention must be easy for clinicians to enact. His sixth and final point was that health systems need to use state-of-the-art risk prediction methodology just as they do for predicting the risk of cardiovascular events, osteoporosis, breast cancer, and other serious conditions. "These are tools that have been developed to address a wide variety of clinical conditions and that have been carefully honed to understand both our ability to accurately predict risk," Grossman said, "and that, at any time you are doing risk prediction and interventions, there is always potential for adverse outcomes and adverse effects. To the extent that we can improve the accuracy and the discrimination of those tools, we will be much better off." He acknowledged that, given the current funding environment, developing such tools for predicting risk of firearm violence will be difficult, but he said that he believes there is ongoing research on mental health services that could be extended to develop multivariate modeling for predicting who is at risk for a firearm injury.

DISCUSSION

Richmond started the discussion by asking the panelists for ideas on how to identify the right person at the right time and place and with the right intervention. Barsotti said that doing so will need to start with identifying when it is relevant for practitioners to evaluate the risk of firearm violence, which will require identifying those patient contexts and presentations for which it is relevant to inquire about a patient's firearm access. He added, though, that he still does not know what the right intervention is. He also said that there is an opportunity to make a better case for funding research. "When we have a more robust and comprehensive view of the problem, we can calculate its burden and costs better in order to make a case for better case for funding," he said.

Grossman agreed that clinicians do not know what to do if they do identify a patient at risk of firearm violence. One reason is that there is a lack of strong evidence to support possible interventions, so clinicians, to the extent they are guided by and trust evidence as a basis for practice, do not have evidence-based guidance. Another reason is that even in the best practices, more work is needed on how to best communicate risk to patients and families. Bair-Merritt remarked that gun violence, as a multidisciplinary problem, will require health systems to be humble and involve various partners from the community—from mental health, for instance, and from law enforcement when it comes to intervening. "Whatever that intervention ends up being, I do not believe health care can do it by itself," she said.

Richmond asked Bair-Merritt if health care systems and providers attend equally to identifying potential victims and potential perpetrators of firearm violence, to which she said no. "If you look at all of the work on intimate partner violence screening, there is much more for survivors of violence than there is for perpetrators of violence," Bair-Merritt said. "There are a few people who are thinking carefully about how we assess risk for perpetrating intimate partner violence." She said that to her it is important when thinking about firearm injury to treat it as more of a syndrome, that is, a collection of symptoms associated in this case with a possible outcome, rather than a disease where the underlying cause is known. "The situation of an adolescent carrying a gun to school is so vastly different from the issue of a survivor of adult partner violence," she said. This indicates that the right intervention will have to be situation-specific.

Barsotti agreed, noting that the diagnostic questions a clinician asks in a mental health assessment depend on the context and collateral history. He said that he would like to have a specifically structured interview about firearm risk given to patients who present with any type of firearm risk, such as a child who presents with certain kinds of accidental injuries, or who appear to be at risk of harming themselves or others. Noting that

elaborate and cumbersome risk assessment tools are already available for firearm injury risk, he asked if it might be possible to create something simple that could start the screening process and perhaps classify someone as low, moderate, or high risk. Such an instrument, he said, would then allow for further research to parse those with moderate or high risk into smaller categories with specific interventions indicated.

With regard to what health systems need to put in place for providers to recognize the need and then screen for those at higher risk, Grossman said a good place to start would be for health systems to develop clinical guidelines that are based on evidence, continually revised when new evidence becomes available, and tailored to the site of care, such as the emergency department or the primary care office. Then these procedures will need to be embedded in the workflow in a way that fits the clinician's practice. As an example, he recounted how clinicians in his health system were uncomfortable when asked to implement a dental fluoride varnish program. Once the program was sold as something that could be implemented in the same way that childhood immunizations were implemented, the physicians got on board. It will also be important, he said, to help providers be confident in their ability to screen and to talk about firearm violence with their patients and to have a system designed to make it easy for clinicians to hand off their patient for the intervention, Grossman said.

Bair-Merritt agreed that there is a need for clinicians to feel confident in their ability to assess risk, given that most are not trained to do so, and also to feel confident that the interventions will be efficacious. One concern of hers, she said, is that the hard conversations around firearm violence in families will contribute to physician burnout. "I think for our system to change, we have to build supports for our workforce as well," she said.

Any progress, Barsotti said, will depend on building a new paradigm for how health systems think about firearm violence, and he noted the health system actually has experience implementing such a paradigm. Forty years ago, he said, physicians thought of child abuse in terms of beat-up kids and bad parents. "Then, over time," he said, "we crafted a child abuse paradigm that enabled elaborate and layered interventions, and as a result, we have seen a decrease in severe child maltreatment. We are at that point right now with gun violence. We have to create a new paradigm on which to build and wrap our brains around this." Grossman agreed and said that this new paradigm is being built partly through advances in behavioral medicine that are working for tobacco and alcohol issues and lead to behavior change. "Clinicians are starting to wake up to the idea that not all interventions involve a needle or a scope, that talking therapy does work and motivational interviewing does work," he said.

Richmond then asked if, to get the biggest bang for the buck, risk assessment should focus on primary care or if it should cross all aspects of

the health care system. Barsotti replied that, as with child abuse, everyone who encounters a person at risk or suspects a person is at risk should refer that individual for follow-up, and there should be social constructs and policies developed to help that process. For example, he said, his home state of Vermont has operationalized extreme risk protection orders.

Bair-Merritt commented on the challenge of convincing every member of the health care team that they have to participate in such efforts, noting that there is still resistance when it comes to screening for domestic violence. "There are some late adopters who are coming around, and there are some people who will never think that this is part of what medicine should be doing," she said. She added that a key finding from a systematic review of IPV interventions in clinical settings was that the most effective interventions were ones that involved everybody, from the front desk person checking the patient in through the nurse, the medical assistant, and the clinician (Trabold et al., 2018). "It has to be a multilayered system that everybody owns a part of," she said.

To Grossman creating clinical guidelines as the key, since guidelines are the foundation for professional behavior. In an integrated health system, culture means everything, he said, and it is important to have a clinical culture that understands that it has certain professional norms, responsibilities, and accountabilities that are developed with broad input and evidence. At his institution, for example, a behavioral health and integration initiative has seen the use of the Patient Health Questionnaire increase significantly through a regimented process of developing and promulgating evidence-based clinical guidelines and providing feedback to those staff members who were slow to get onboard with this initiative. Peer pressure, Grossman added, is a powerful incentive for change.

Bair-Merritt said that she is concerned that asking about domestic violence will become a checklist item rather than a true conversation. On the other hand, Gregory Simon from Kaiser Permanente Washington State said that simple multiple choice, yes/no questions administered on clipboards or in waiting room kiosks by medical assistants with not much more than high school training are quite accurate at identifying people who are at high risk for self-directed violence or death by suicide. "Since the health care system has a proud tradition of squashing the good enough for lack of the perfect, I would say let's not do that here," he said.

When asked about how to create a culture and environment where productive conversations can occur, Grossman answered that the challenge is to provide a process that allows physicians to see that such conversations are valuable to their patients. Such intrinsic incentives—as opposed to paying for performance—are hard to operationalize in a prevention setting because the clinician is not likely to see what does not happen. "It is much easier to be gratified by a patient that heals in the trauma center and see-

ing the importance of the work that you did there," he said. One solution would be to study the effects of an intervention, use the results to estimate how many lives are saved, and point to those results as a means of making providers proud of their efforts to do the right thing by their patients. Barsotti suggested that it could be useful to publish case-based narratives that describe opportunities of how and where clinicians can intervene.

Richmond asked the panelists about the possibility of identifying and supporting protective factors in addition to looking at risk. Barsotti and Grossman both said that there is little evidence concerning protective factors for firearm violence. Bair-Merritt said that there is some evidence about individual-level, neighborhood-level, and community-level factors that are protective when people are in domestic violence relationships, but there is a need for more robust interventions to nurture those protective factors. Barsotti said that in communities where firearm ownership is the norm, it will be important to engage firearm owners in efforts to identify those behaviors that are protective and which ones are not. In his experience working in a rural environment, he said, screening patients for firearm ownership has never turned into a political discussion. Moreover, every time there was somebody in the community who was perceived to be at risk, the community or family acted to secure the lethal means. "It is never a problem, because they recognize the risk, and are all on board," Barsotti said.

When asked to identify important research questions to address that would enable health systems to accurately identify higher-risk individuals, Grossman said it would be important and helpful to develop multivariate models, particularly around the interaction of alcohol and mental health, in order to better understand who is at higher risk for gun violence and to identify the key variables driving gun violence. "We have become good at predicting univariate risk, but not so great on multivariate risk," he said.

Barsotti said he would propose studying the trajectory of risk in order to identify transition points where low risk becomes moderate or high risk. Bair-Merritt said it would be important to understand the benefits and risk of screening in a health system. For example, if screening identifies a family situation where there is a risk of firearm violence, it could trigger a call to child protective services and trauma for the family. "We think screening and identification are great," she said, "but we need to think about potential risks for our patients as well." Grossman agreed with Bair-Merritt and noted that USPSTF routinely looks at harms associated with screening methods, treatments, and interventions.

George Isham asked the panelists if there are certain populations that are more at risk of firearm violence and if health systems should develop a priority list for screening. Bair-Merritt and Grossman agreed that prioritization would be a good approach, given that firearm violence is still a relatively rare event. Barsotti said that there is low-hanging fruit in each

domain of violence and after identifying the population at greatest risk within each group, health systems should roll out a program to capture the easiest, most readily identifiable populations. Richmond added that the populations most at risk will vary depending on the health system and the communities it serves.

Bechara Choucair asked if there is a role for publicly available data from outside the electronic health record (EHR) that would be useful for creating predictive models. He said that Kaiser has treated more than 11,000 gunshot victims in its emergency departments in 2016 and 2017. "Can we imagine a day," he asked, "where we have an algorithm that would tell me here are the 11,000 people who are likely going to be coming to our emergency department dealing with gunshot wounds, and let us think about the right interventions to be proactive with those 11,000 members so we can get to them before they end up being victims of gun violence in our emergency department?" Grossman agreed that the field needs to be nimbler in its use of external data, although, he pointed out, linking and integrating datasets is challenging. His research institute at Kaiser Permanente, for example, routinely links enrollment data to death certificates in order to understand what is going on its member population. Washington State's new Accountable Communities of Health process, which is empowering and funding clusters of counties to be accountable for their own epidemiology and planned interventions for their own regions, is a promising approach to community-focused interventions, he said. Barsotti said that many victims of gun violence belong to a network of other high-risk individuals, and social media may provide an opportunity to identify those network members.

An unidentified workshop participant noted there is a new documentary film—*Portraits of Professional Caregivers: Their Passion, Their Pain*[1]—that illustrates the effects of exposure to gun violence victims on their caregivers and providers. This film, the participant said, prompted the Philadelphia city council to hold hearings in December 2018 on the issue of secondary trauma in professional caregivers and first responders.

Carnell Cooper said that when the University of Maryland started its hospital-based, violence prevention program two decades ago, the health system would see a few domestic violence patients. Then, about 8 years ago, the health system decided it needed a program aimed specifically at domestic violence, and it soon started getting about 100 referrals per year. Four years ago, the University of Maryland embedded a mandatory screen in its EHR—it had to be completed before the patient's record could be closed—and that number jumped to 500 referrals per year. He then asked the panel whether they thought an EHR screening processes would be use-

[1] See http://caregiversfilm.com (accessed October 30, 2018).

ful. Bair-Merritt said yes, but added that such a screen has to be accompanied by training for providers so that they know how to respond to this information. Cooper agreed but said he thought that having a specific group of providers trained as a response team would work best because some groups—he named trauma surgeons—are not going to want to respond.

Evelyn Tomaszewski from George Mason University suggested that clinicians or others with lived experiences might be the best counselors in a health system, an idea that Barsotti and Bair-Merritt agreed had value. Grossman said that the lived experience of the targeted population is also a critical factor in understanding what interventions might work. "We cannot test interventions without really fully engaging and involving the target population in that process," he said. For example, he said, he and his colleagues conducted a randomized trial of gun safes in rural Alaska among the Alaska native population, and they spent time with that population trying to understand its behavior around guns as well as to understand what is socially acceptable around storage practice. "We tried to map that out ethnographically before we even began to think about implementing the trial," he said.

As a final comment to close the discussion, Rebecca Cunningham from the University of Michigan reiterated an earlier message that different settings will require different solutions and that those solutions do not have to be physician-centric. "Physicians may be great at raising awareness," she said, "but they do not necessarily [have to] be the answer for either the screening component or the intervention components."

5

Developing Health System Interventions

Session 3 focused on interventions that health systems can adopt going forward. The two speakers in this session were Marian Betz, an associate professor of emergency medicine at the University of Colorado School of Medicine, and Megan Ranney, an associate professor of emergency medicine at Brown University and the chief research officer at the American Foundation for Firearm Injury Reduction in Medicine (AFFIRM). A question-and-answer session moderated by George Isham and an open discussion followed the two presentations.

DEVELOPING A FIREARM STORAGE DECISION AID TO ENHANCE COUNSELING ON ACCESS TO LETHAL MEANS

Betz began by acknowledging that she, like most every other health care provider, has complex views about firearms. On the one hand, she said, she works on the front lines as an emergency medicine specialist, and she is frustrated by the senseless injuries caused by firearms. At the same time, she is a proud Colorado native, and hunting is a part of the culture for many people, including her extended family, and responsible gun ownership is a way of life for many people. While she has lost friends and family members to suicide and has been left struggling with thinking about how she could have prevented those deaths, she has also had some of the most satisfying collaborations in her professional career working with firearm ranges, gun retailers, and firearm owners. "At the core of my work is something that may sound a little simplistic," Betz said, "but it is important that we recognize that our views vary, but nobody wants to lose a family member or

friend. Nobody who owns a firearm is okay with a family member dying by suicide or a child dying by accident. We need to come back to recognizing that everybody wants their loved ones to stay safe."

Betz said that of the 36,658 firearm-related deaths in 2016, 59 percent were suicides and that 50 percent of all suicides are by firearm (CDC, 2018). "This is why you cannot talk about reducing firearm deaths without talking about suicide, and you can't talk about reducing suicide deaths without talking about firearms, because they are so closely linked in this country," she said. Though most discussions about firearm violence center on homicides and mass shootings, which account for approximately 39 percent and 0.3 percent of firearm deaths, respectively, tackling the problem of suicide by firearm is equally important and will require different solutions than for homicides, she said (CDC, 2018). Being suicidal is not a terminal illness, and about 90 percent of people who survive an episode of having suicidal ideation or who attempt suicide do not later die by suicide (Owens et al., 2002). At the same time, she said, firearms have the highest case fatality rate of any method of suicide at 85–90 percent: higher than any other methods (Spicer and Miller, 2000). "Certainly, we should be talking to patients about making the environment safe in many ways, but firearms are the method where there is usually no second chance," Betz said.

Another fact about suicides, she said, is that although suicide attempts often occur on a background of longstanding mental illness and other risk factors, the period of highest risk is often somewhat short. "The time point between deciding to take action and taking action can be in the range of minutes to hours," she said, "and that's why we think about trying to keep someone safe during this particularly high-risk period." Betz added that people who live in homes with a firearm in them have higher odds of death by suicide. This is not because of differences in suicidal ideation or mental illness in gun owners versus non-gun owners, but rather because if a person can access a firearm at that moment of crisis, they are more likely to die. She added that there is some evidence that counseling the parents of adolescents at risk of suicide can lead parents to change how they store their firearms. This is called Counseling on Access to Lethal Means (CALM), an intervention now recommended, especially in emergency departments and mental health settings in the context of suicide risk. Betz thinks of it as similar to appointing a designated driver when someone in a group is intoxicated or at risk of becoming intoxicated. In the context of suicide risk, she encourages people to either lock their firearms and put the key in a place where the person at risk will not have access to it or else to remove the firearms from the home and store them somewhere else, at least temporarily.

CALM alone is not a solution to the suicide problem, Betz said; instead it must be part of a comprehensive prevention approach that should address all types of upstream risk factors and that intervenes along a trajectory of

suicidal behavior. Given that emergency departments are a key site for care of patients at risk of suicide, emergency department staff need tools to enable them to do a better job of identifying those individuals and caring for them. Unfortunately, Betz noted, she and her colleagues have found that CALM is not used in a majority of instances when a patient was clearly at risk of suicide (Betz et al., 2016, 2018).

Among the barriers that inhibit discussing firearm access in the home are a lack of time, workflow issues, and the fact that some health care providers are unsure if they are allowed to ask about firearms. "The short answer is yes, it is okay to ask," Betz said. However, although it is legal to ask, many practitioners do not know how to raise the question in a way that is nonjudgmental and will not offend the patients or family members. And even if they ask the question, physicians often do not know what to say if there are firearms in the home. Betz said that she had one colleague, for example, who asked her if a patient had to be hospitalized because of having some mild suicidal thoughts and owning a gun. The answer was no, but it was important to think about how to reduce access to that person's firearms. "These are real questions from front line providers, because we were never trained in how to do this," Betz said.

Provider training is important, she added, and so too is having interventions that are acceptable to patients and providers. Such interventions need to use respectful and neutral language because they are not intended to change somebody's identity as a gun owner. "This is about helping them be safe and then encourage behavior change," Betz said.

In her work, Betz said, she has been interested in the decision-making process around firearm storage, particularly when someone in the home is at risk of suicide. She and her colleagues decided to use the Ottawa Decision Support Framework (Murray et al., 2004), a three-step, evidence-based process for making health or social decisions that involves assessing what both the patient and provider need to make a decision; providing decision support in the form of counseling, tools, and coaching; and evaluating the decision-making process and outcomes. The basic idea behind the framework is that making a high-quality decision requires knowing the options and then making a decision in line with personal values that produces the desired outcomes.

In the case of firearm safety, Betz said, she and her colleagues want to know what people think about different firearm storage options and to provide them with options from which they can pick based on what is best for their particular situation. With support from the National Institute of Mental Health, her team has built a decision aid which they are now testing and will make available when they have completed testing, likely in spring 2019. This decision aid is not intended to replace discussion with a health care provider; rather, the patient (or concerned family or friends) can work

through it alone and then discuss it with a provider. The resulting Lock to Live decision tool is intended for adults with suicide risk, and Betz's team is working with colleagues at the University of California, Los Angeles, to develop a version for adolescents.

Lock to Live has three preference questions, Betz said:

1. How open are you to storing your firearms temporarily with someone else, away from your home?
2. When looking for storage options, how concerned are you about cost?
3. How open are you to storage options that involve a background check?

Betz said there have been some pilot programs handing out cable gun locks in clinical settings. That raises the question, she said, of whether health systems need to invest in providing storage devices—and in what kind of devices. "I do not know what the answer is, and I do not think we know yet what drives these kind of decisions," she said, "but it would be great if we could know so that we could get people the devices they need and will use."

Betz said that any actions in the realm of suicide prevention have to include language emphasizing hope and that people will get better and that these actions should also encourage patients to engage with their families or trusted loved ones. Messaging in the decision aid also normalizes the ideas that many other people go through tough times, and that temporary storage is something that many people do in the same situation. Confidentiality is important, Betz said, as a vocal minority has expressed concern about having any mention of firearms in their health record. She noted that recruiting patients at risk of suicide for her study is challenging, as is recruiting patients who own firearms and encouraging trust and honesty.

Going forward, Betz said, she hopes to see decision tools developed for adolescents and military veterans and studies carried out that look at firearm storage more generally (separate from those studies that examine the times of greatest suicide risk). She and her colleagues are also examining approaches to training providers about firearm safety, though it is not clear yet what effect it will have on patient behavior. It will be important to adjust how physicians talk to their patients in a way that is nonjudgmental. "We need to figure out how to leave our politics and our personal views outside of the exam room and learn how to really talk to and learn from both our patients and our peers, because surveys show that a large proportion of physicians also own firearms," Betz said.

CREATING CONSENSUS: DEVELOPING A FIREARM INJURY RESEARCH AGENDA

Concerning creating a consensus around an agenda for firearm injury research, Ranney referred to a 2013 Institute of Medicine (IOM) and National Research Council (NRC) report that outlined five areas where research was needed on firearm injury prevention: the characteristics of gun violence, needed interventions and strategies with an emphasis on policy options, gun safety technology, the effect of video games and other media on gun violence, and risk and protective factors for engaging with gun violence. The recommendations in this report, Ranney said, are at a high level and are not particularly relevant for the individual clinician in practice.

Around the same time that the IOM and NRC report came out, several medical organizations issued consensus statements on what needs to be done to prevent firearm injury and death (Dowd and Sege, 2012; Stewart and Kuhls, 2016; Streib et al., 2016; Weinberger et al., 2015). All of these calls for action were largely concerned with policy issues and were based on the best available evidence, which Ranney said has limited applicability to clinical practice. In fact, a 2016 systematic review that she and her colleagues conducted found only 53 articles examining clinician attitudes or practice patterns around firearm injury, 7 papers of low methodological quality that examined patient attitudes about firearm screening, and 12 studies—only 6 of which were randomized controlled trials—that assessed patient-level interventions (Roszko et al., 2016). "Our consensus was there was pretty much nothing for us to achieve consensus on, so let us go back to the table and start again," Ranney said.

In response to finding scant evidence, Ranney and her collaborators assembled a group of stakeholders which included representatives of the full scope of emergency medicine, including those with tactical and military experience and Ph.D. researchers. This group started working to create a consensus agenda for what emergency physicians need to know to solve the problem of firearm injury, using a standard practice for creating a consensus agenda known as the nominal group technique (Hegger, 1986). This process started with the Haddon Matrix mentioned earlier in the workshop. The working group settled on five types of firearm violence: self-directed violence, including suicide and attempted suicide; intimate partner violence; peer violence; mass violence; and unintentional injury. A literature review by the various subgroups for different types of injury generated 61 questions, after which a round-robin discussion generated 222 potential research questions. Further refinement by the group produced a final list of 63 distinct research questions. These were eventually reduced to 59 questions with input from external stakeholders, including the tactical emergency medical service section, the public health and injury prevention committee, and the trauma

and injury prevention sections of the American College of Emergency Physicians. Of these 59 questions, 16 mapped to the 2013 IOM and NRC report. The working group published the final list in 2017 (Ranney et al., 2017).

Ranney, Betz, and Garen Wintemute also published a paper that laid out what they thought was the best-quality evidence for what physicians should be doing in the clinical space (Wintemute et al., 2016). This paper identified three conditions indicating when firearm information might be particularly relevant to the health of a patient, and potentially to others: acute risk for violence to self or others based on information or behavior; individual-level risk factors for violence to self or other or unintentional firearm injury; and being a member of a demographic group at increased risk for violence to self or others or unintentional firearm injury, such as middle-aged and older white men, young African American men, and children and adolescents.

Based on the consensus agenda, Ranney and her collaborators have been developing resources for providers, including the What You Can Do website[1] and a series of handouts that can be given to providers and patients. She and others worked with the Massachusetts Attorney General's office to identify what steps are legal for practitioners and patients to take. For example, a physician might have a domestic violence patient whose partner has a gun. "Can I tell her legally that she can take the gun to a pawn shop?" Ranney asked. In many states, doing so is illegal, she said. Working with the American Medical Association, she and her colleagues have also developed a continuing medical education module that provides advice to health care professionals.[2]

An example of a different type of project related to the consensus agenda is the iDOVE project, a brief intervention for violence-prone adolescents that involves automated texting. This study is ongoing, Ranney said, and its initial results were promising. Going forward, she added, thinking about innovative ways to use technology to facilitate patient–provider conversations will be important to reduce barriers for providers.

At the end of the day, she emphasized, there is still virtually no funding for this type of clinically relevant research. One analysis found that between 2004 and 2015, funding of research on gun violence was only 1.6 percent of what it should have been based on mortality burden (Stark and Shah, 2017) (see Figure 5-1). Meanwhile, the fatality rate for gunshots is rising (Sauaia et al., 2016) (see Figure 5-2). "Gunshot wounds are the only type of traumatic injury with increasing case fatality rates," Ranney said, "and although we have these wonderful research agendas, they are just agendas

[1] See https://www.ucdmc.ucdavis.edu/vprp/WYCD.html (accessed October 30, 2018).

[2] The Continuing Medical Education course was released online on December 7, 2018, and is available at https://edhub.ama-assn.org/provider-referrer/5823 (accessed January 7, 2019).

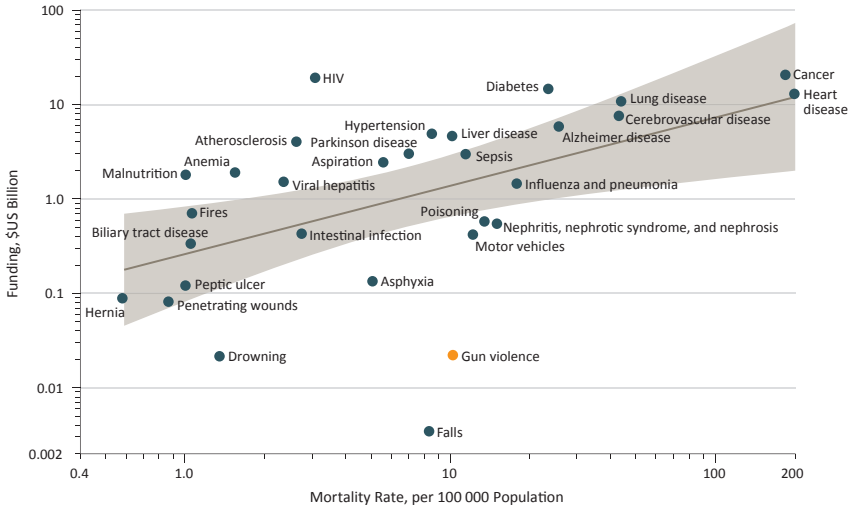

FIGURE 5-1 Funding of research on gun violence and other leading causes of death.
SOURCES: As presented by Megan Ranney at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; Stark and Shah, 2017.

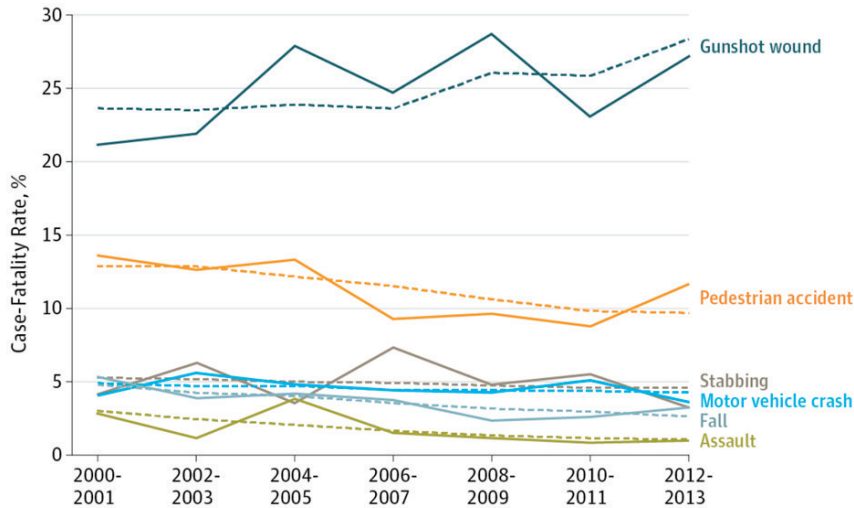

FIGURE 5-2 In-hospital case fatality rate for traumatic injuries.
NOTE: Unadjusted rates are the solid lines and adjusted rates are the dashed lines.
SOURCES: As presented by Megan Ranney at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; Sauaia et al., 2016.

without funding and action. Many of us have found ways around the lack of funding to try to do our best to get answers, but without a concerted effort from our community and those that we partner with, it is not going to move forward."

Ranney concluded her comments by reminding everyone why this work is important. "I want us to remember that the reason why we are all doing this is not for our own careers and not because we want our health systems to look awesome and not because we are searching for NIH [National Institutes of Health] funding," she said, "but because of our communities and our patients and our friends and family members." It is her belief, she said, that with a broad consensus that includes Americans from across the political spectrum and across every locality in the United States, reducing the human toll from gun violence is possible.

DISCUSSION

Betz said that while firearm violence in schools is increasing and is certainly a cause for concern, adolescents are far more likely to die by suicide than in a school shooting. This is something that parents need to be educated about, particularly in communities where many parents own firearms. "How do we change the message so that guns stay locked up until the kids leave the house, not when they are 13 and have taken a safety course?" Betz asked. "How do we help our patients and our communities understand those relative risks?" Ranney said that the important thing, which she credited Betz with doing, is to make sure that the voices of the people who need to hear that message are themselves heard. "Talking to a bunch of non-gun owners about how we are going to stop suicide by firearm is not the solution," she said.

Isham asked Betz and Ranney to comment on what will be needed when handing off interventions to those who would scale and deploy them across every emergency department in a given region. Ranney, noting that there is a science behind dissemination and implementation, offered a few ideas. First, the intervention cannot require more workforce to implement, which is where technology will be helpful. Second, health system leadership will have to support implementation and encourage it to happen. Third, it will be important to provide feedback and help clinicians see the value of the intervention using evidence. Betz added that appropriate patient-facing technology will help get information to patients without making more work for clinicians. One question she had concerned how information on firearms will interface with the electronic health record.

Julie Richards from Kaiser Permanente Washington commented that in a recent training she took with social workers in her health system on safely planning with patients identified as being suicidal, she learned that

social workers who were gun owners themselves had a much easier time talking about firearms with their clients. She then asked the panelists how they get feedback from stakeholders about the effectiveness of a decision-making tool. Betz replied that she and her collaborators conducted one-on-one interviews with iterative versions of the tool as a means of identifying specific words and imagery in order to make sure that viewpoints were balanced and the words used were neutral, given that the materials would be used in a health care setting. One lesson from these interviews was that providers who do not own guns need to know more about them to avoid sounding naïve when talking to patients and losing their trust. This does not mean that providers need to become gun experts, but they do need basic information to respond intelligently and respectfully to the most common questions they will get. She said that she has never had anybody get angry at her for bringing up the subject of safe gun storage because, for example, she tries to hold that conversation from a place that is genuine.

An unidentified participant wondered if, when asking the question "How open are you to removing your gun from your household?" there is room for motivational interviewing when it is clear that removing guns from the household is not going to happen with a particular patient. Betz replied that the decision aid was designed to walk through the process with the patient and blend with motivational interviewing.

Grossman asked the panelists if having the option of invoking an extreme risk protective order (ERPO) offers potential opportunities to reduce suicide by firearm. Ranney replied that in most states, only law enforcement or a family member can initiate an ERPO. A clinician could talk to law enforcement or encourage family members to report their loved one, but in most states the belief is that if reporting becomes mandatory, as it is with domestic violence, disclosures will decrease. That said, she noted that Wintemute is conducting a study looking at the use of ERPOs. What he found so far, she said, is that there were few reports initially and more after some educational outreach occurred. "I think this is an area that is ripe for research and intervention," Ranney said. "I think we have to be very careful to not put health care providers in a spot that will reduce help seeking."

Betz added that ERPOs are promising for preventing harm, particularly in the context of mass shootings. In the context of suicide prevention, she said, ERPOs will likely be the last resort for most families. Betz said she hoped that as ERPOs are being evaluated, researchers will collect anecdotes and evidence on their misuse, which she has heard would be useful from her colleagues in the firearms world. "I think there are valid concerns about whether people are going to be abusing them or not, and it would be great if eventually we can have data on what is happening and which states have model laws to then think about how we as health care providers can be aware of them to potentially use them."

Christopher Barsotti commented that collecting data on the cohort of people who have been the subject of an ERPO could provide important information on the trajectory and transition point to being at a high risk for suicide. He then asked Betz if her study includes an option of removing the firing pin from a gun, similar to the approach the military uses of removing bullets from the guns of active military personnel who are identified as being "at risk" so that these individuals do not suffer the stigma of such an identification. Betz replied that it is not an option in her program because removing the firing pin would be complicated for family members who are not familiar with a particular firearm. She did add that this option might work well for families that have a loved one with dementia who might become anxious when they find that his or her gun is missing.

Kristin Brown from the Brady Campaign and the Center to Prevent Gun Violence said that her organization embarked on a process 2 years ago to research how to talk to gun owners about the dangers of guns in the home. One piece of feedback they got from interviews with some 100 gun owners in 8 markets was that the term "gun owner" has become stigmatized in U.S. society; this does not serve the interests of the gun violence prevention movement at all, Brown said. That discovery prompted Brown and her colleagues to come up with a new term—family fire—for incidents that occur as a result of an improperly stored gun in the home and to develop a campaign focused initially on children to end family fire. She then asked the panelists for any feedback they could provide from their discussions about safe storage with their patients. Betz replied that she does not see many children in her emergency department, so all of the conversations she has had have been with adults. Ranney added that as an emergency room physician, she does not have many safe storage conversations. She did note that a study conducted a decade ago did look at motivational counseling in pediatric practices and found high acceptability and feasibility in self-reported changes in storage (Barkin et al., 2008; DuRant et al., 2007). She also called for research on how and when to have a conversation on safe storage in a way that does not alienate families. Isham added that the nature of such conversations will likely have to be region specific to reflect local attitudes about firearm ownership.

6

Key Issues from the Workshop's First Day

In the final session of the workshop's first day, Thea James, an associate professor of emergency medicine and the associate chief medical officer, the vice president of mission, and the director of the Violence Intervention Advocacy Program at the Boston Medical Center, moderated a lengthy discussion with three panelists. The panelists were Patrick Carter, the assistant director of the Injury Prevention Center and an assistant professor of emergency medicine at the University of Michigan School of Medicine; Joseph Simonetti, a clinician investigator at the Veterans Health Administration's (VHA's) Rocky Mountain Mental Illness, Research, Education, and Clinical Center for Suicide Prevention and an assistant professor at the University of Colorado School of Medicine; and Daniel Webster, a Bloomberg professor of American health in violence prevention and the director of the Johns Hopkins–Baltimore Collaborative for Violence Reduction at the Johns Hopkins Bloomberg School of Public Health.

James began the session by remarking that the day's discussions represented a paradigm shift in that they focused on looking at firearm violence and injuries in much the same way that other diseases are approached. However, she said, what still has to happen is for work on firearm violence and injury to focus on the root causes of this disorder with an eye on prevention, in what she termed an "enhanced medical model." Other takeaways from the day's discussions, she said, included the intersection of firearm violence and injuries with root causes in the community and the importance of identifying what needs to happen to stop injuries from happening in the first place; the importance of addressing behavioral health issues and giving providers the tools to assess risk; and the need for both

qualitative and quantitative research that will drive implementation and impact.

James said that many of the young male gunshot victims that come into Boston Medical Center's Violence Intervention Advocacy Program have tattoos that reflect what these men feel about the hopelessness of their futures, with slogans such as "Born to be hated, dying to be loved," or "Living is hard, dying is easy." To provide some form of hope for these individuals, she said, the program focuses on providing avenues for these individuals to alter their quality of life by addressing the social determinants of health, including jobs and housing, and any behavioral health issues. The program also provides behavioral health services for family members and other people close to the victim.

GETTING HEALTH SYSTEMS INVOLVED

Turning to her first question, James asked the panelists for their ideas on how to convince health systems that they have a role to play in this space and how to be successful in preventing firearm injuries and fatalities, given the range of factors outside of health care that lead to firearm violence. Carter replied that health care systems have to focus on the value of the services they provide for their consumers, which requires knowing the community; the prevalence of disease, including firearm violence, in the community; and how to address that most successfully within the context of the community. At the same time, he said, it will be essential to help the clinical staff understand that efficacious programs to prevent violence can have a positive effect for their patients, similar to the success of other programs and prevention efforts for commonly treated diseases such as stroke, diabetes, and heart attack. Carter also referred to Stephen Hargarten's call to think of firearm violence as a biopsychosocial disease. Carter said that, in his opinion, reframing firearm violence in terms of a disease model leads to a focus on addressing the underlying causes of the disease. For example, no emergency department would treat a patient who had a stroke without also addressing their underlying hypertension and smoking before sending them home. "To not address the issues that are putting patients at risk for violence and firearm-related outcomes should not be considered the standard of care, especially when it is the second leading cause of death for youth in this country," Carter said.

Another reason for health care systems to engage in this problem is that prevention does have a financial benefit, both to society and health systems, he said. For example, one study showed that a single-session intervention delivered in the emergency department can reduce violence outcomes at a cost of less than $17 per violence event averted (Carter et al., 2016). James remarked that giving health systems an opportunity to have a social impact

and a return on investment is ideal, and Simonetti said that one reason that integrated health systems and the VHA are so interested in addressing firearm violence is that they often bear the financial burdens of treating spinal cord injuries, chronic posttraumatic stress disorder, and other long-term consequences of firearm injury. He said, too, that clinicians want training and materials allowing them to do a better job preventing firearm injuries and firearm-related suicide.

Simonetti said he believes that research has a huge role to play in incentivizing how health care systems adopt firearm prevention as part of their mission, not just because research funding will attract academic institutions to become more involved and not just because research is critical for determining whom to screen and what to do once at-risk individuals are identified. "It could also be important in making this everybody's problem," he said, pointing to the diversity of expertise and areas of interest represented by the attendees at the workshop. As an example, he cited work showing that about half the individuals who die by suicide have no diagnosed mental health or substance-related condition (Boggs et al., 2017, 2018), a fact that most primary care doctors do not know. He commented that firearm suicide is a tremendous problem among palliative care patients but that the conversation around suicide prevention in oncology is just beginning. "If we make this a problem for more people in the room and not just those in the emergency department, I think care will follow," he said. Requiring that health systems address gun violence, or violence generally, as a requirement for certain types of certification could be a useful incentive, he added. No trauma center, for example, should be certified as such if it does not have a risk recidivism program with mandated mental health therapy in place. James said that the American College of Surgeons is exploring the possibility of requiring that interventions be in place for certification.

Webster commented on the different approaches that will be needed to address firearm violence and firearm suicide. In his opinion, he said, there are more opportunities to both screen for and intervene with suicide, and he said he is confident that health systems will respond to the challenge of reducing firearm-related suicide. He said that his doctoral dissertation research on how parents think about their children's risk of firearm injury found that parents are "pretty much in complete denial that their children or teens might ever be suicidal," which suggests that research on how health systems can get through to parents about the risks of adolescent suicides will have a positive impact. Health system response to more assaultive firearm violence will be more challenging, he said, though it might become more tractable if health systems were financed to prevent disease rather than to treat disease.

Webster said that he appreciates the optimism that firearm violence can be solved based on the nation's successful work in reducing, for example, smoking and drunk driving. However, firearm violence is different in one

important way, he noted: people do not smoke or drink and drive because they think it will make them safer, whereas people decide to own guns because they believe a gun makes them safer. "Yes, we will have some lessons for things that we have done successfully in these other realms," Webster said, "but we also have to recognize guns are unique and present a unique safety challenge." This challenge is magnified, Simonetti added, by the fact that firearm injuries and death are low-probability events and people are generally bad at personalizing low-probability events.

When James asked Webster to comment on how he believes health care systems can engage with the community to reduce gun violence and death, Webster replied that the Cure Violence program, a public health intervention, is one approach that focuses on building relationships with credible messengers in the community who can help resolve conflicts and take other steps to reduce violence in the community. There have been some successes with this type of program, he said, adding that he believes they can be made even stronger, particularly with regard to providing better support for the staff of these programs. "I think we should rise to the challenge of the complexity of this problem and build on Cure Violence and other community models," Webster said. Carter agreed that partnerships between a health care system and its community can be a powerful approach for addressing gun violence, and he said that work within the Michigan Youth Violence Prevention Center demonstrated that combining health care–focused behavioral interventions for violence (i.e., Project SYNC) with other multi-level social and community-based interventions can have a powerful effect on reducing violence within communities (Carter et al., 2016; Heinze et al., 2015). Other important steps health systems can take will be resolving how best to work and form cooperative relationships with law enforcement using approaches such as the Cardiff model, particularly in places where there is a police department that is not driven by evidence or oriented toward prevention; and understanding and addressing policies that create the conditions, such as the link between redlining and poor quality housing, that increase the risk of gun violence.

HELPING PROVIDERS WITH THE AFTERMATH OF GUN VIOLENCE

James turned the discussion to the subject of how to deal with the secondary trauma or vicarious trauma that providers at all levels can experience when dealing with the victims of firearm violence or suicide. Simonetti replied that the first thing health systems can do is to recognize there is an impact on providers and then create a safe space for providers to talk about their feelings and experiences. Carter suggested holding debriefings among staff after they have treated a trauma victim and agreed that creating a safe

space for staff to talk about their feelings is key. From some of the work he has done implementing efficacious violence prevention services within emergency department settings, he said, he has learned that providing staff with the tools to help their patients can serve as a way to address the feeling of hopelessness that often comes with treating large numbers of firearm violence victims. In one ongoing implementation project, Carter said, the nurses participated enthusiastically in the implementation of the program as it provided them a way to feel empowered to do something to address the problem of violence and gave them a way to be a part of the solution to stopping the cycle of violence in their community.

HELPING HEALTH SYSTEM LEADERS ACT

When asked what information would help institutional policy makers understand their role and what actions they need to take, Webster said that it is imperative to help health system leaders find motivation to prevent firearm violence rather than simply treat it. Local data will drive that transformation, Simonetti predicted. "Understanding your own patient population and the issues that affect the people coming in your door is motivating for many health care systems," he said. It is also important, he added, to provide health care systems with effective interventions and strategies to deal with the problem coming through their door, which is where the research community plays a critical role.

For Webster, the key question that health system leaders need to ask is whether they want to "own" prevention of firearm violence and suicide and take responsibility for it. Today, when there is a homicide or suicide in the community that his institution serves, nobody blames the institution for failing to prevent those events, and, as a result, nobody at the institution feels an obligation to prevent firearm-related homicides, injuries, and suicides. "I would love to see a change in that where we all have shared responsibility for this problem and doing something about it," Webster said.

The one exception to this abdication of responsibility, Simonetti said, is veteran suicide, which the Department of Veterans Affairs (VA) takes seriously and for which it accepts responsibility even though its health care system (the VHA) sees only 20 percent of the approximately 20 million U.S. veterans annually. As a result, the VA has started programs dealing with housing and unemployment, working with veterans in rural communities, and doing community-based research.

SHIFTING THE PARADIGM

James's last question for the panel regarded what they would do to shift the paradigm of what is being done today in order to see an impact on gun

violence and injury. Webster said that Johns Hopkins, the largest private employer in Baltimore, is addressing one of the social determinants by hiring people from the community it serves who have been victims of gun violence. Simonetti said that the VA has developed a predictive model for identifying veterans who are the highest of high risk of attempting suicide and has targeted interventions for those who screen positive. The VA is also expanding work from one to three large rural communities with high veteran suicide rates to see how it can build a community-based infrastructure for suicide prevention. He said that enacting a population health approach in the community is challenging but that it will be important in moving to the next level of effectiveness. Carter agreed that a multilevel approach that partners health systems with communities offers the best opportunities for significant progress.

DISCUSSION

George Isham said that when he was on the Community Guide Taskforce that looked at evidence for population-based interventions, one of his observations was that many of the successful programs for implementing change across populations were multicomponent interventions, and he said he suspects that the same will hold true for a topic as complex as firearm violence and death. Isham also reinforced the idea that there will be a role for both public and private institutions to get involved in addressing this issue, and he suggested thinking about the kind of conversations that could be carried out among the board members and senior management of a health system about responding to some of the community's needs. He said that he has had success recruiting epidemiologists and other experts in his health system to develop relationships with senior leaders and influence the investments they make over time.

Isham then commented that there are lessons to learn from the Alliance of Community Health Plans' successful implementation of evidence-based care across its large health system members. These lessons include

- Generate consensus among decision makers about what is important and where the focus will be.
- Put together teams of skilled people, adequate resources, and capabilities to address the problem.
- Educate and train staff and develop evidence-based processes.
- Make sure that there are data and information to characterize the problem and monitor progress to identify victories.
- Ensure that incentives are aligned in order to reduce or eliminate barriers.

Gregory Simon, referring to Webster's and Simonetti's comments on accountability, said he believes that there is a reasonable path of accountability that does not re-traumatize staff but also identifies what could have been done better at the last touch with a patient who later committed suicide. He also suggested calling out successes and not just failures. Rebecca Cunningham from the University of Michigan said that accountability will need metrics and incentives, just as there are metrics relating to, for example, care for children with asthma. Joel Fein from the University of Pennsylvania Perelman School of Medicine added that framing firearm violence as a health and public health issue should drive health systems to take responsibility for addressing this problem. In the role of responsible party, health systems can convene all of the stakeholders needed to truly address this problem in a multifactorial manner and provide much of the expertise and talent to do so.

An online participant asked the panelists if they have faced challenges to their research from firearm lobbyists. Webster said he has been doing firearm research for almost 28 years, and the paucity of research funds has not kept him from doing research, but it has affected the scope of his research, particularly research concerning more in-depth questions.

An unidentified workshop participant asked the panelists if there is a way to empower physicians to do something more outside of their work environment, such as serve as active spokespersons and advocates for patients, as part of a process of helping them heal from the trauma and hopelessness of caring for victims of firearm violence. Webster's response was, "Absolutely. That is occurring, and it has occurred on any number of issues, but certainly for firearms." In the aftermath of the Sandy Hook tragedy, he said, he was overwhelmed with people in his health system coming to him and asking what they can do to stop this senseless violence. "You have a voice. You have credibility. Use it," he said. Health care practitioners, he added, have the ability to discuss firearm violence as a public health problem and take the politics out of the discussion.

Simonetti said that clinicians advocating for violence prevention programs within their emergency department or trauma center can have an impact both in terms of getting a program installed and alleviating some of the frustration and helplessness that clinicians on the front line are feeling today. "It has been my experience that people are hungry for this, especially if you are regularly treating patients with gunshot injuries and suicides," Simonetti said. Carter agreed and pointed to the importance of involving the entire health care team in these efforts and employing technology so that the burden of screening and intervening does not fall totally on the backs of physicians.

On a final note, Simonetti said that clinicians can be successful in promoting actions in this space, both in their health care systems and the larger

community. "I think clinicians have a more powerful voice than they think they do, particularly when they group together," he said. James agreed and added, "We should not constrain ourselves by what we think is possible."

7

Programs and Research

Day 2 of the workshop began with a morning-long session highlighting programs that are successfully addressing the prevention of firearm injuries and death. The speakers in this session were Michael Levas, an associate professor of pediatrics at the Medical College of Wisconsin and the assistant medical director of Project Ujima; Ali Rowhani-Rahbar, the Bartley Dobb Professor for the study and prevention of violence, an associate professor of epidemiology and pediatrics, and the violence prevention section leader at the University of Washington's Harborview Injury Prevention and Research Center; Rebecca Cunningham, an associate vice president for research at the University of Michigan, a principal investigator with the Firearm Safety Among Children and Teens (FACTS) consortium, the director of the Centers for Disease Control and Prevention (CDC)-funded University of Michigan Injury Prevention Center, a professor of emergency medicine at the University of Michigan School of Medicine, and a professor of health behavior and health education at the University of Michigan School of Public Health; Rinad Beidas, an associate professor of psychiatry, medical ethics, and health policy and the director of implementation research at the University of Pennsylvania Perelman School of Medicine; and Kyle Fischer, an adjunct assistant professor of health policy and the leadership fellowship director at the University of Maryland School of Medicine. A question-and-answer session and open discussion moderated by Joel Fein, a professor of pediatrics and emergency medicine at the University of Pennsylvania Perelman School of Medicine, a co-director of the Children's Hospital of Philadelphia Violence Prevention Initiative, and the research co-director of

the National Network of Hospital-Based Violence Intervention Programs (NNHVIP), followed the five presentations.

Before introducing the first speaker, Fein noted that violence prevention initiatives focus on different types of violence, such as youth violence or intimate partner violence (IPV). However, as the speakers would show, there is a common thread that runs through all forms of violence and that the delineation among them is artificial.

PROJECT UJIMA

Addressing youth violence, Levas said, requires recognizing that there are four major components to account for the youth victims, the communities they come from, the health care system that for the most part has taken a patch-up-and-send-back-out-to-the-community response, and law enforcement and the legal system. Project Ujima was designed to work at the intersection of these four components. The project started some 20 years ago when a 16-year-old boy named Jason ended up dead of multiple firearm injuries at the Children's Hospital of Wisconsin, and one of the emergency department nurses recognized this child from a previous visit. A review of his medical record showed that he had first been seen at age 8 for an accidental injury, then at age 11 for an assault, age 13 for stab wounds, and age 15 for a gunshot wound. "We had missed opportunity after missed opportunity, and the result was a dead child," Levas said. "Can you imagine if we missed cancer that many times? That would not be acceptable."

For children who are victims of violence, there are often upstream flags that could identify them as potential future victims of more serious violence. With Project Ujima, when a child between age 7 and 18 comes into the emergency department as a victim of a stabbing, physical assault, or gunshot wound, a Ujima staff member comes to the emergency department, tries to enroll the family in the program, and starts encouraging no retaliation. Levas said that data from the Milwaukee Homicide Review Commission show that 50 percent of violent injuries and deaths result from arguments or retaliation. For families that agree to join the program, Project Ujima wraps the children in services, starting with an assignment to a case manager who helps the child and family members get to their appointments, arranges for wheelchairs if necessary, and works to get the family home compliant with Americans with Disabilities Act requirements if the child is left paralyzed by the wounds. Levas explained that the program will even arrange for the family to move to new housing if the place the child was injured causes re-traumatization.

Project Ujima offers a variety of programming directed at the children, including afterschool programming for adolescents and teens and a summer camp for about 60 children in Milwaukee who have been victims of

violence. This camp gets the children to a safe location during the most dangerous time of year for youth violence, Levas said. It provides messages of empowerment and leadership and classes on a range of subjects, including conflict resolution, conflict avoidance, and, when needed, hygiene.

Project Ujima has expanded its reach by enrolling children who have had a family member killed, and of the 338 children enrolled in 2017 in Milwaukee, 126 had suffered vicarious trauma as a result of having a direct family member murdered. Another 178 children came into the program after being seen in the emergency department, and 34 children were victims of domestic violence.

To test Project Ujima's effectiveness at curbing youth violence, Levas and his colleagues have been using validated patient-reported outcomes. A recent analysis of these reports showed that children who are victims of violence, even vicarious trauma associated with violence, show worse quality-of-life measures, physical functioning, psychosocial functioning, emotional functioning, and school functioning than youth with chronic disease (Levas et al., 2018) (see Table 7-1). These data show that being direct or vicarious victims of violence is as bad for a child's ability to function normally as being morbidly obese or having cancer; Levas said he suspects that this is due at least in part to the victims of violence receiving less support than children with other health conditions. The good news is that participation in the 6-week Project Ujima summer camp can improve those scores (see Figure 7-1), as well as scores for depression, anxiety, and anger (Levas et al., 2016).

Currently, Levas and his colleagues are examining how much of the low scores seen in patient-reported outcomes results from the actual violent

TABLE 7-1 Youth Victims of Violence Score Significantly Worse Than Healthy Youth on Patient-Reported Outcomes

Category	Violently Injured	Healthy Individuals		Racially Similar Group	
PedsQL™	Mean	Mean	P Value	Mean	P Value
Total function	71.43	83.91	<0.001	76.92	0.001
Physical function	76.62	87.77	<0.001	93.02	<0.001
Psychosocial function	67.63	81.83	<0.001	73.08	0.005
Emotional function	62.93	79.21	<0.001	70.37	0.010
Social function	75.25	84.96	<0.001	76.63	0.584
School function	63.79	81.31	<0.001	72.23	<0.001

SOURCES: Adapted from a presentation by Mike Levas at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 18, 2018; Levas et al., 2018.

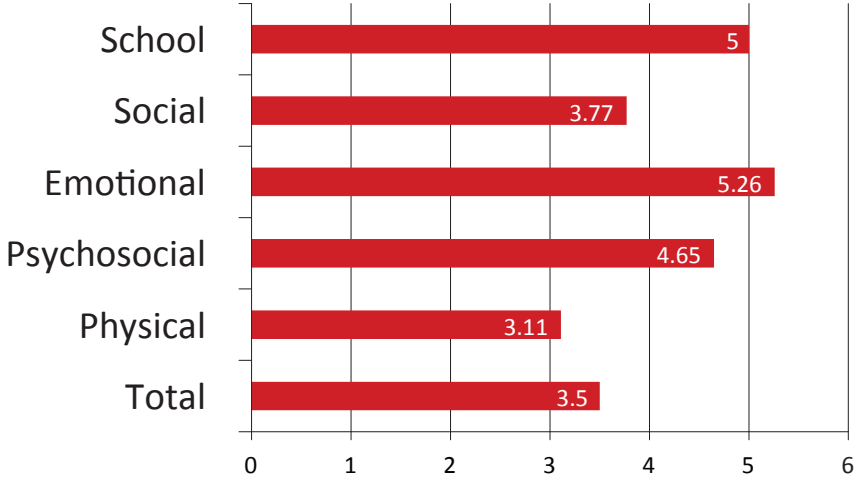

FIGURE 7-1 Project Ujima summer camp improves patient-reported outcomes.
NOTE: On the scale, 0 is the worst ranking in terms of outcomes, and 6 is the best ranking.
SOURCES: As presented by Mike Levas at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 18, 2018; Levas et al., 2016.

event and how much is tied to the place where these children live, given that Milwaukee is the most segregated city in the nation. The Project Ujima staff are now enrolling youth victims of violence along with youth from the same neighborhoods, matched on gender and race who have not been injured by violence. "What we want to do is try to take into account how much of the social determinants of health that are impacting them from their built environment," Levas said.

After recording baseline scores from patient-reported outcomes, adverse childhood event scores, and measures of posttraumatic stress disorder, the researchers follow up on these children every 3 months in an attempt to find out which children are being helped most by the program's interventions. "Traditionally we had a blanket approach with Project Ujima, where every kid would get just about every intervention," Levas said, "but we realized that we could be smarter and more targeted if we look at the kids, look at their scores, look at the interventions that are being done, and really try to find out which kids might really benefit from camp and which kids do not, which kids need the behavioral specialist early before any other programing is going to really affect them."

Levas acknowledged that Project Ujima is reactionary, not prevention oriented, in part because its funding comes from Victims of Crime Act dollars. He and his colleagues are now looking at markers, descriptive variables, and pre-enrollment experiences for Project Ujima participants so

that when the program can get funds for prevention, they will have already identified which children were at risk and perhaps be able to help them avoid Jason's fate of repeat injuries and eventual death.

Levas said that Project Ujima does not make money for the Children's Hospital of Wisconsin or the Medical College of Wisconsin. "It is the right thing to do, and the hospital recognizes that, matching every Victims of Crime Act dollar the program receives," he said. At the same time, the Children's Hospital has been an early adopter of other violence prevention and intervention initiatives, including one that looks at how the hospital system interacts with law enforcement and police to tackle youth violence. For the past 3 years, Levas and his colleagues at the Children's Hospital and the Comprehensive Injury Center at the Medical College of Wisconsin have been implementing the Cardiff model in Milwaukee to collect data on injuries and combine those data with law enforcement data. The researchers have also partnered with the local level 1 trauma center and two other community hospitals to expand the program. The data collected so far show that only 7 percent of the incidents of youth violence recorded by these health systems were known by the police; when mapped, the combined data could lead to improved surveillance by law enforcement, Levas said. "This was another opportunity where the hospital was able to add to the narrative of where interventions should be done and really try to help civil society get better information to work on," he said.

HELPING INDIVIDUALS WITH FIREARM INJURIES CLINICAL TRIAL

Some 35 years ago, Rowhani-Rahbar said, researchers observed that individuals who experience a trauma and also misuse alcohol are at high risk of recurrent injury (Rivara et al., 1993). Several years later, a randomized trial showed that providing a brief, motivational, interviewing-based intervention as a component of trauma care significantly reduced alcohol consumption and decreased the rate of trauma recidivism by 47 percent (Gentilello et al., 1999). The authors of that study concluded that because of the prevalence of alcohol problems in trauma center patients, screening, intervention, and counseling for alcohol problems should be routine, and today trauma centers are required to identify at least one member of the trauma team to receive training in how to administer these screenings and brief interventions.

What this has to do with firearm injuries, Rowhani-Rahbar said, is that it offers an approach that might work with modification to reduce the risk of gun violence recidivism. In fact, studies that he and his colleagues conducted in the aftermath of the Sandy Hook tragedy showed that individuals who had been shot and hospitalized were 21 times more likely than

those hospitalized for non-injury reasons to get shot again and return to the hospital (Rowhani-Rahbar et al., 2015, 2016a) (see Table 7-2). "Not that we did not know that these individuals are at risk of getting shot again, but these results showed the magnitude and scope of the problem," he said. These studies also showed that members of the firearm injury group were more likely to be arrested within the first year after being shot.

Rowhani-Rahbar said that members of NNHVIP, formed in 2009, use a trauma-informed care model which includes taking advantage of a teachable moments to interrupt the costly cycle of violence. He added that while there is an accumulation of good evidence that these programs work and are cost-effective, there is still a long way to go to provide more evidence to support the effectiveness and implementation of these programs. Toward that end, his team launched the Helping Individuals with Firearm Injuries randomized controlled trial at Harborview Medical Center in Seattle, with data collection scheduled to end in 2019.

The intervention they are testing has three components: a motivational interview done at the bedside or in the emergency department; a critical time intervention (CTI); and attention from a multidisciplinary team comprising colleagues from community services, law enforcement, mental health, employment, education, and housing. Prior to delivering a CTI,

TABLE 7-2 Suffering a Gunshot Wound Increases the Risk of Getting Shot Again

	Hospitalization		
		Nonfirearm	
Index Hospitalization	Firearm (Any Intent)	Assault	Self-inflicted
Violent injury (*n* = 8,655)			
Firearm, assault (*n* = 613)	21.2 (7.0–64.0)	7.3 (3.5–14.9)	1.7 (0.5–5.3)
Nonfirearm, assault (*n* = 2,453)	3.1 (0.9–10.3)	6.6 (4.0–10.7)	2.1 (1.3–3.5)
Nonfirearm, self-inflicted (*n* = 5,589)	0.8 (0.1–5.8)	1.6 (0.8–3.3)	11.9 (9.5–14.8)
Nonviolent injury (*n* = 62,428)	1.7 (0.8–3.8)	2.5 (1.7–3.5)	2.1 (1.7–2.6)
Noninjury (*n* = 175,039)	1.0 (reference)	1.0 (reference)	1.0 (reference)

SOURCES: Adapted from a presentation by Ali Rowhani-Rahbar at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 18, 2018; Rowhani-Rahbar et al., 2015.

the staff members work to develop a trusted relationship with the patient. Phase 1 of the CTI then provides support and begins to connect the patient to people and agencies that will assume the primary support role. Phase 2 of the intervention monitors and strengthens this support network and the patient's skills, while Phase 3 terminates the CTI once the support network is in place, which typically takes 6 to 9 months.

The data collection, which relies on self-reported surveys and several administrative databases that together cover criminal justice involvement, health care use, depression, posttraumatic stress, substance use, life satisfaction, social support, physical and mental health–related quality of life, and exposure to violence, occurs at 1 month, 3 months, 6 months, 9 months, and 1 year. Rowhani-Rahbar explained that the frequently repeated surveys help retain individuals in the study, which is not an easy task. In fact, he said, the study has faced three challenges. The first is the cost of having staff available 24 hours per day, 7 days per week to reach every individual who comes into the trauma center. The second challenge has to do with the socioeconomic status of the participants, many of whom have low incomes, may have difficulty commuting from their residence to the trauma center, and may move frequently. The third challenge is to deal with the distrust that many of these individuals have for authorities and institutions. Dealing with this last challenge requires having support specialists or case managers with lived experiences who can talk with these individuals and provide them help guided by elements of trauma-informed care.

Though the study is still ongoing—it has enrolled 225 patients and hopes to enroll 250 by year end—positive feedback from participants in the trial has been quite motivating, Rowhani-Rahbar said. On a final note, he said, "I think we all have a duty to raise awareness about these HVIPs [hospital-based violence intervention programs]. We need to do enhanced communication among those involved in the implementation and evaluation of these programs—I can say that the more advocacy, the better—to get additional resources for this type of work."

SAFERTEENS: AN EVIDENCE-BASED YOUTH VIOLENCE PREVENTION PROGRAM

In 2009, Cunningham and several colleagues authored a paper that presented some of their thinking about what the trauma community should be doing before and after a patient reaches the trauma bay (Cunningham et al., 2009). One conclusion they drew was that many of the young people seen in the emergency department for violence-associated injury use the emergency department as their primary or sole access point to the health care system. Another finding was that 97 percent of the injured youth seen in emergency departments are treated and released the same day, often in

the middle of the night when few social work resources are available. Data from the Pediatric Emergency Care Applied Research Network found that 52 percent of children with a firearm injury go home from the emergency department and receive no follow-up resources until the next time they come to the emergency department (Carter et al., 2017). Cunningham and her colleagues concluded that while many emergency departments are trying to do something to prevent youth violence, many others were not even doing risk assessment. The situation is better today, she said, but neither risk assessment or any intervention from the emergency room is still part of the standard of care for youth violence victims.

The SafERteens intervention model was developed when the National Institute on Alcohol Abuse and Alcoholism provided funding to help prevent violence among youth with a history of alcohol use and fighting. This upstream model serves youth ages 14 to 18 who come into the emergency department for any reason, as long as they are medically stable. If these individuals answer yes to questions about having engaged in fighting or alcohol use over the previous few months, they receive a 30-minute, single-session emergency department intervention from a trained counselor while they are waiting for various medical procedures. The screen is administered using a tablet computer to reduce the time requirements on the staff. The results of an assessment of the program showed that this brief intervention decreased severe peer aggression over the following 3 months and 1 year (Cunningham et al., 2012; Walton et al., 2010). In fact, the intervention decreased violent victimization and aggression among youth. It also reduced the frequency of consequences associated with engagement with violence, including getting in trouble with friends, having problems at school, and dating violence (number needed to treat = 40).

A cost analysis of the SafERteens program showed that a single-session, 30-minute intervention implemented by a large health system in all of its emergency departments would prevent some 4,000 violent events over 5 years and would cost approximately $4 to $55 per event prevented. Considering that an average emergency department visit costs more than $1,300, a tetanus shot costs $129, and an intravenous saline infusion costs $417 per hour in the emergency department, Cunningham argued that this is a cost-effective approach to upstream prevention and that cost should not be a significant barrier to implementation (Sharp et al., 2014).

One somewhat surprising finding, said Cunningham said, was that the youth who came to the emergency department for problems not related to violence, such a sore throat, were quite interested in talking about violence in their lives. “These kids are incredibly interested in talking about the violence,” she said, “because violence is one of the most important things that is going on in their life, overwhelmingly, and nobody is talking to them about that violence.” Another spinoff study from the SafERteens program found

that providing this intervention to every adolescent who walked through the emergency room door and lived in a known high-risk neighborhood, with no screening, decreased the violent victimization events those children experienced over the next 6 months by 52 percent ($p < 0.001$) and decreased violent aggression by the teens by 49 percent ($p < 000.1$) (Carter et al., 2016). Cunningham and her colleagues have now packaged this intervention and offer trainings to other health systems that want to implement the SafERteens program.

Cunningham cautioned that SafERteens is not a solution for all youth violence. "There are kids that have more severe needs and who need wrap-around care, but we have kids [in the emergency department], and while we have them, this is something we can do for them at that time," she said. It would be great, she added, to have funding to study the synergistic effects of deploying SafERteens and Project Ujima at the same time. "What we need for the National Network of Hospital Violence Programs is funding at the level our stroke centers are funded at to actually make a difference," Cunningham said. She and her colleague, Patrick Carter, have since started thinking about how to apply this approach to firearm-related injuries and extend it beyond the emergency department using, for example, an app to facilitate multi-session counseling interventions once individuals leave the emergency department.

Another study that Cunningham discussed followed a cohort of youths who had come to the emergency department with any assault-related injury and a matched cohort of youths who came to the emergency department without an assault-related injury. Assaulted youth had twice the risk for a later violent injury than those who had not been assaulted, and 59 percent of the assaulted youth reported experiencing some form of firearm violence during the 2 years of the study, with 8 percent sustaining a fatal or non-fatal firearm injury and 77 percent reporting that firearm violence was not limited to a single episode (Carter et al., 2015).

Using the data from this study and a machine learning algorithm, Cunningham and her colleagues developed a SaFETy Score risk that predicts future firearm violence from four questions (Goldstick et al., 2017):

- In the past 6 months, including today, how often did you get into a serious physical fight?
- How many of your friends have carried a knife, razor, or gun?
- In the past 6 months, how often have you heard guns being shot?
- How often, in the past 6 months, including today, has someone pulled a gun on you?

Cunningham said that CDC has funded a series of youth violence prevention centers that looked at how multilevel interventions could decrease

violence in general over time in a community. Michigan's Youth Violence Prevention Center worked with Flint, Michigan, to carry out six evidence-based interventions that spanned multiple ecological levels, with a version of SafERteens called Project Sync, and the evidence-based Youth Empowerment Solutions school resiliency program focused on the individual, mentoring models at the social level, and community policing and clean-and-green neighborhood improvement programs at the community level. "This is how a health system partners with a community to make it work," Cunningham said. This multifaceted approach, she added, produced a significant decrease in assault offenses and violent injury presentations to the emergency department in youth ages 10 to 24 in the intervention neighborhood as compared with a control neighborhood (Heinze et al., 2016).

Before talking about the Firearm Safety Among Children and Teens (FACTS) consortium, Cunningham reiterated the need for more grants to fund firearm research, particularly given the number of deaths caused by firearms compared to other disorders that have been well funded over the years (see Table 7-3). In 2014, she said, there were fewer than 12 active and experienced U.S. investigators with careers focused primarily on firearm injury, only 2 of whom were physicians, despite the fact that firearms are responsible for 16 percent of the deaths among children ages 1 to 17, more than any other cause other than motor vehicle collisions.

The FACTS consortium (see Figure 7-2) was funded by an initiative of the Eunice Kennedy Shriver National Institute of Child Health & Human

TABLE 7-3 Federal Funding of Firearm Research and Number of Deaths Compared to Other Disorders

Cause of Death	Number of Deaths Over 10 Years (ages 1–19)	Number of Research Awards Over the Past 10 Years (all ages)	U.S. Dollars of Public Funding for Research (all ages)
Motor vehicle collision	44,821	2,902	$1,084,364,160
Firearm	27,830	9	$2,393,083
Malignant neoplasms	18,792	2,939	$1,558,955,478
Drowning	9,766	101	$27,556,259
Congenital abnormalities	10,199	15,616	$6,344,957,752
Meningitis	585	75	$34,063,406
Polio	0	456	$464,966,937

SOURCE: Adapted from a presentation by Rebecca Cunningham at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 18, 2018.

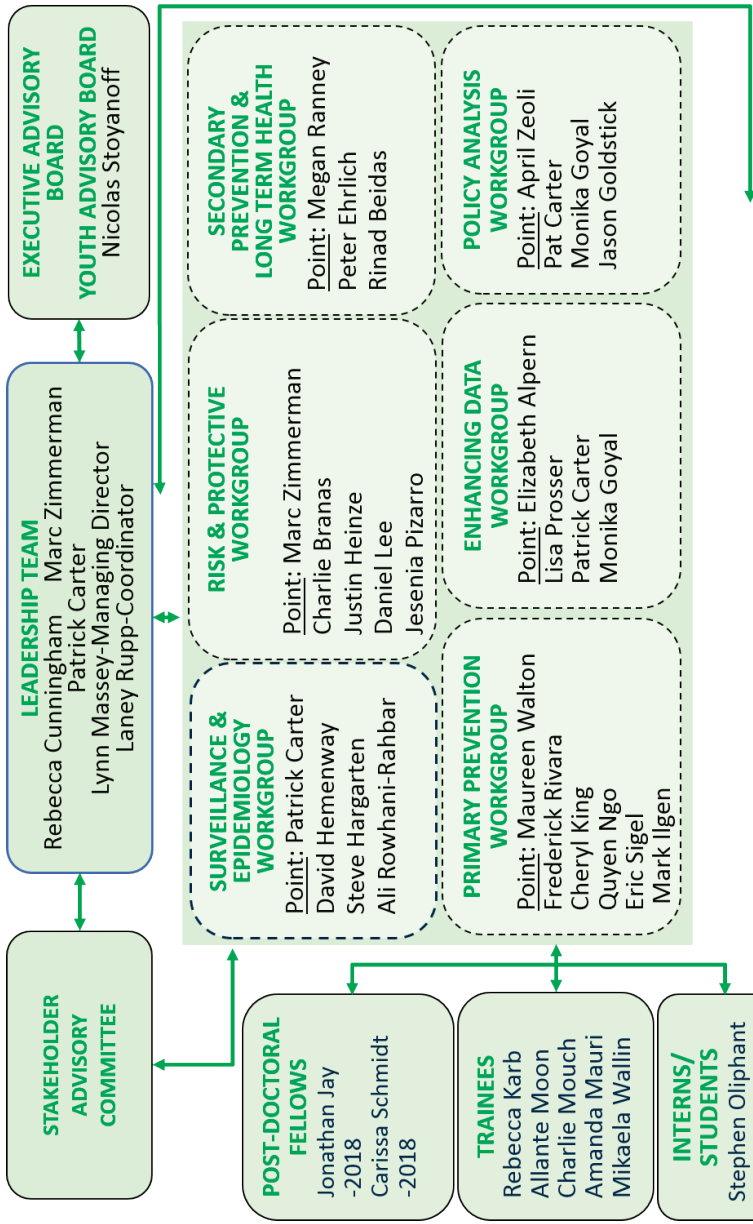

FIGURE 7-2 Organization of the Firearm Safety Among Children and Teens (FACTS) consortium.
SOURCE: As presented by Rebecca Cunningham at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 18, 2018.

Development in 2017 to jumpstart capacity building needed in the field. Currently, the consortium has some 25 content experts working across disciplines to improve firearm safety and reduce firearm injury and deaths among children. The consortium will define a pediatric-specific firearm injury research agenda, conduct core studies to provide preliminary data which will then inform large-scale studies and fill early data needs, establish a Web-based, searchable data archive for childhood firearm injury, and build a cadre of national research scholars that will serve as an emerging pipeline for future research. FACTS makes available a series of counseling videos created by investigators that demonstrate and model for young pediatricians how they can have a conversation with parents about safe firearm storage in a nonjudgmental way.

PARTICIPATORY APPROACHES TO IMPLEMENTING FIREARM SAFETY PROMOTION IN PEDIATRIC PRIMARY CARE

The rate of youth suicide in the United States has increased 56 percent since 2007, Beidas said, with firearms being among the most common and most lethal suicide methods, particularly for males. In 2016 the rate of suicide deaths in children was 6.1 per 100,000, with firearms responsible for half of those deaths. In her opinion, Beidas said, firearm access is a modifiable risk factor for suicide, and safer storage could save lives. The good news, she said, is that there is an evidence-based, office-based counseling intervention for increasing parental safe firearm storage called Safety Check (Barkin et al., 2008).

When thinking about how to reach the most youths with a universal intervention such as Safety Check, Beidas said, she and her colleagues concluded that pediatric primary care was the best option, given that more than 75 percent of youth visited primary care in 1 year proceeding an attempted or completed suicide, compared with only one-third of youth who visited a behavioral health provider. Collaborating with the Mental Health Research Network—a National Institute of Mental Health–funded consortium comprising 13 heath systems organized in a practice-based research network—Beidas and her colleagues conducted a 2-year study in two of those health systems located in Michigan and Texas. The study started with a quantitative survey that asked physicians and leaders of practices that saw youth about the acceptability of the intervention components of screening, counseling, and handing out firearm locks. Next, the researchers conducted in-depth interviews with 9 stakeholder groups and 70 individuals to gather richer and more nuanced information about the acceptability of the intervention as well as about barriers to and facilitators for implementation. Of the physicians who responded to the survey, 60 percent were female, 31 percent reported having a firearm in their

home, and 13 percent reported that there had been a youth suicide in a practice where they had worked.

The results from the quantitative portion of the study, which at the time of the workshop were under review prior to publication, found that 85 percent of the physicians reported that they used screening rarely or sometimes, 80 percent used counseling, and 9 percent handed out gun locks. However, only 28 percent of the physicians endorsed using screening and counseling most or all of the time, and only 2 percent would hand out gun locks most or all of the time. Beidas noted that previous studies, including a systematic review by Rowhani-Rahbar (Rowhani-Rahbar et al., 2016b), suggest that free safe storage devices may be the critical ingredient to preventing youth suicide by firearm, so these results suggest more research is needed before going to large-scale implementation.

One of the findings from the qualitative study was that recent high-profile gun-related incidents, such as the Sandy Hook and Las Vegas mass shootings, are making it easier for clinicians to initiate questions about firearm storage in the home (Wolk et al., 2018). Beidas said that she and her colleagues also heard about the importance for system buy-in and alignment with priorities before going forward with large-scale implementation as well as about variability in the comfort level that physicians had in talking about firearm safety, which depended on an individual's knowledge about firearms and how much confidence they had in talking to parents about firearm safety. Regarding who might be tasked with implementing each of the three components, Beidas said that the message was clear that nurses or medical assistance could do screening and give out firearm locks, but that physicians should administer the counseling component.

The qualitative interviews revealed a high level of acceptability and feasibility concerning screening and counseling, Beidas said, and it was suggested the electronic health record (EHR) should be used for screening and providing written resources for safe storage recommendations. There were concerns about financing, storing, and distributing firearm locks as well as about liability. It was suggested that clinicians could refer patients referred to get free locks in the community rather than distributing them through primary care or in a hospital setting. One of the major barriers to implementation, Beidas reported, was the need to fit this intervention into an already packed schedule.

Analysis of the qualitative interviews with gun owners, who were individuals in law enforcement and from firearm advocacy groups as well as firearm safety course instructors and firearm retailers, one finding was that there was a concern among gun owners that screening would lead to documentation in the EHR and inclusion in a national registry. There was the sense that screening was not necessary to do the other parts of the intervention and also a lack of trust and a feeling among gun owners that

a public health platform is a disguise for firearm control. "I think we really need to heed this message and attend to it," Beidas said, "and on the same side of that coin, the need for partnership, which may allow us to heal that rift and to build trust. Our gun owner constituents suggested that it would be critical for health systems to think about partnering with firearm safety experts, such as safety course instructors, who are more credible and knowledgeable to firearm owners."

As part of this work, Beidas and her collaborators generated a list of implementation strategies that they hope to test in a future trial:

- Creating a plan for who on the medical team will be responsible for implementing each component of the Firearm Safety Check.
- Changing the clinic or health system policies to encourage the implementation of the Firearm Safety Check.
- Integrating the intervention into the EHR.
- Training providers how to implement the Firearm Safety Check.
- Making changes to the workflow to make it easier to implement the intervention.
- Sharing information with providers and caregivers about the importance of the intervention and the problem it addresses.
- Developing marketing strategies targeting leadership and providers.
- Identifying and preparing provider and leader champions.
- Identifying sources of funding to support implementation.

One insight Beidas said she has gained is that it will likely be necessary to expand thinking beyond suicide prevention. "If we are going to be taking a universal approach, we should be thinking about unintentional and intentional firearm injury prevention so that we can make it most relevant to the broadest swath of the health system," she said. Based on these studies, though, she said that she believes that Firearm Safety Check is feasible, acceptable, and ready for implementation with some tweaks. "I think the time is ripe, and I might ask: what are we waiting for?" she said. "We know that there is something that works, and we should be thinking about implementing it and testing the success of that implementation." One necessary tweak will be to consider safety tools other than cable locks, which are not acceptable to many firearm owners, she said. One possibility is to incorporate a decision aid into the intervention so that parents can make informed decisions about which locking mechanism makes the most sense for them.

In closing, Beidas noted that this work is about keeping youth safe by promoting firearm safety. "This is not about firearm control, and that message needs to be the message that underpins all this work," she said. "This cannot be about docs versus Glocks." She noted, too, the importance of

partnering with all constituents, particularly gun owners. "If we want to be trusted, we need to leave our politics outside of the exam room and work together around these issues related to firearms. I would go even further to say we must hear the voice of all stakeholders, not just the ones we want to hear."

Going forward, she said, there is a great deal to learn about how best to partner with firearm owners around a shared agent and build trust. There are also questions related to how to adapt the intervention to optimize its effectiveness and whether the intervention should be universal or targeted. Effectiveness trials with rigorous endpoints are needed, she said, as are large implementation trials testing different implementation strategies to see which ones result in the best uptake.

STATE OF THE SCIENCE FOR HOSPITAL-BASED VIOLENCE: RESEARCH AND POLICY IMPLICATIONS

HVIPs, Fischer explained, combine a brief in-hospital intervention with intensive, community-based case management and provide targeted services to high-risk populations to reduce the risk factors for re-injury and retaliation while cultivating protective factors. What this means in practice, he said, is that when someone comes into the hospital having been injured violently, they must receive care using a team-based approach that extends long beyond leaving the hospital as a means of dealing with the traumas that started before the injury and the new traumas that persist after the injury (see Figure 7-3). "There are many things you need to do to make sure people heal," Fischer said.

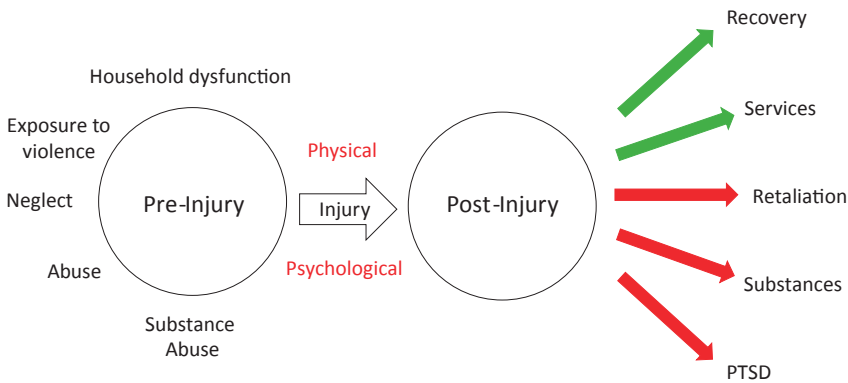

FIGURE 7-3 The many traumas that occur before and after a violent injury.
NOTE: PTSD = posttraumatic stress disorder.
SOURCE: As presented by Kyle Fischer at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 18, 2018.

The HVIP takes a team-based approach centered on the patient to address all of these traumas preceding and resulting from violent injury. The team can include a doctor, case manager, trauma nurse, social workers, counselor, and the HVIP violence prevention professional. Fischer called the violence prevention professional the most important person on the team, the engineer that does all of the work and makes sure that everyone comes together to make sure the patient gets the services he or she needs. HVIPs typically hire these individuals from the communities in which they will work. Often, they also have a history of violent victimization and are therefore able to form a mentoring relationship with a victim and both translate and explain everything that team members say to them so that the patient follows through on their recommendations.

With that as background, Fischer highlighted some of the most important research on HVIPs. To begin with, data from 19 studies show clearly that without any program focused on people who have been injured violently, the rates of repeat violent injury range from 8 percent to 62 percent, with a median value of 27 percent (Greene, 2016). When an HVIP is involved, however, several observational trials have found the re-injury rate to be under 5 percent (Bell et al., 2018; Juillard et al., 2016). A retrospective cohort study that looked only at re-injury and death found no statistically significant benefit for an HVIP over the 18-month study period, but it did reduce the risk of criminal justice system involvement (Shibru et al., 2007), and two pediatric randomized controlled trials of programs similar to an HVIP though not as comprehensive found some benefits in terms of reducing fights and fight injuries in the months after an initial violent injury (Cheng et al., 2008a,b).

More data are needed in the pediatric realm, Fischer said, and he predicted that the work that Levas and others are doing will shed a great deal of light on what program components matter most for children. He noted that one common problem with doing randomized, controlled trials involving violence is that many institutional review boards consider them unethical and will not approve trials that do not provide the intervention to all participants.

For adults, there have been two randomized controlled trials showing a marked reduction in re-injury for individuals treated by an HVIP, with one trial showing a reduction in violent re-injury from 36 percent to 5 percent (Cooper et al., 2006) and the other from 20 percent to 8 percent (Zun et al., 2006). A third, small trial in which many of the individuals had already been sentenced to prison did not find a significant difference between the control and HVIP-treated group (Aboutanos et al., 2011). While none of these studies were perfect, Fischer said, they all found re-injury rates that were lower when an HVIP was administered than was seen in the 19 studies he mentioned earlier that did not include an HVIP. “Things are looking

promising," he said, "and there are many places to fill in the gaps, but right now I am very encouraged by the data." Currently, Fischer said, there is large trial of the Healing Hurt People program in Philadelphia that should be able to provide the most definitive data yet on the effectiveness of HVIPs.

Helping those who have been victims of violence is about more than just preventing re-injury and death, Fischer said, and there have been a variety of studies that have looked at the effect of HVIPs on the social determinants of health that play such an important role in firearm violence. One study, for example, found that over half of the victims of violence needed mental health services, and the HVIP was able to meet those needs for 85 percent of the participants (Juillard et al., 2016). Other studies, he noted, have looked at providing substance abuse treatments, services that address housing, education, and employment, and even tattoo removal.

In the policy realm, Fischer said, perhaps the most important change related to violence prevention programs has been the Patient Protection and Affordable Care Act's (ACA's) Medicaid expansion. "The Medicaid expansion includes young adults who earn less than 138 percent of the federal poverty level, and if you think about it, these are our patients," Fischer said. In fact, he said, one analysis found that after the Medicaid expansion, U.S. taxpayers are now accountable for nearly half of the $10.7 billion in annual charges for the acute care of those injured by violence, which underscores the economic benefit to states and the federal government of preventing interpersonal violence. In fact, a modeling study that Fischer and his colleagues performed before the ACA went into effect found that states would find implementing HVIPs to be cost-effective and that it would perhaps save them money (Fischer et al., 2014).

DISCUSSION

Levas, responding to a question about data sharing among health care systems, community partners, and law enforcement, said that in an ideal world every partner would have access to all available data, which will require building partnerships and trust. The Health Insurance Portability and Accountability Act (HIPAA) creates some hurdles for the sharing of some hospital-level data, but data can be de-identified so that public health departments, for example, can request data without violating HIPAA regulations. "Getting the public health department within your city and state involved is crucial, because that can break down a lot of barriers," Levas said. Political issues may create challenges for accessing police data, he added, but the district attorney's office can often provide the same data.

Carol Pearson from Voice of America asked why someone would put a lock on a gun purchased for self-protection or store ammunition in one safe and the gun in another. Cunningham replied that, regardless of why a

family owns a gun, she does not know a single gun owner in the country that wants that gun used by their depressed teen or by their toddler. That, she said, is the reason to talk to families about why they need to store their guns safely, and that is the common ground around why safe storage needs to exist.

Pearson then asked why the panelists were optimistic, given the issues facing many of the victims of firearm injury and death and the lack of affordable mental health services in the communities most affected by gun violence. "This is a complex problem," Cunningham replied, "but the idea that this problem is too complex for us to solve is simply garbage. There is no reason with proper investment that we cannot figure out how to get our head around a complex problem like this. In fact, even with almost no funding for the past 20 years to do any of this work, amazing groups around the country have bubbled up with innovative solutions, have put them into place, and have begun to find effects with even small programs along the way." Levas added that mental health is receiving more funding—his group just received a large grant from the Department of Justice to expand mental health programming, for example, and it is planning to add embedded mental health workers to its team—because the community's knowledge and funders' knowledge about the importance of providing mental health services is evolving. Fein said that his program at the Children's Hospital of Philadelphia has also added mental health workers to its team, and Beidas, a child psychologist, said that there are a number of evidence-based practices, such as trauma-focused cognitive behavioral therapy, that programs are drawing from to support their patients.

David Grossman asked the panel about the need to generate systematic evidence using common processes and outcomes to inform robust clinical guidelines. Fein replied that one goal of the research workgroup for NNHVIP was to formulate a set of common outcomes for its programs and measures for assessing those outcomes. The network is now working to develop a database to collect data on these common outcomes from multiple programs, he said.

An online workshop participant asked the panel to speak about the role that the American Academy of Pediatrics (AAP) plays in fostering practitioner and health system attention to violence. Levas replied that AAP has a council on injury and violence prevention that is working on recommendations, such as for car seat injuries, and is paying more attention to gun violence. "I think that the American Academy of Pediatrics has a large and important voice in recommending screening," he said, "and right now they are talking about having screening in primary care clinics." AAP has also supported large effectiveness trials, Beidas added.

Fischer noted that over the past few years physician specialty societies in general, including the American College of Surgeons' committee on

trauma and the American College of Emergency Physicians (ACEP), have started looking at gun violence. In fact, ACEP recently passed a resolution saying that it believes violence to be a health-based problem with health-based solutions and public health–based solutions. Beidas cautioned that while it is important for physician specialty societies to give signals that firearm violence is something to attend to, practice will not change and guidelines will not be issued until there are strategies working at multiple levels to change clinician behavior.

Carnell Cooper asked the panelists about their screening procedures, and Beidas replied that when she does the implementation trial, she plans to work with health systems to tailor screening to fit the particular context of each clinical setting. Rowhani-Rahbar said that the intervention he and his colleagues are implementing includes multiphase screening that first determines if an individual meets the study's eligibility criteria and then proceeds through tailored, case-by-case screening to determine what supports each individual needs.

Cunningham said that screening is complicated in health care settings, as illustrated by the challenges of screening for IPV. She strongly encouraged the field, as it moves to large-scale screening, to not get to the place that IPV screening is currently, which is that someone does it while looking at a computer with the spouse in the room and checks a box to move to a new screen in the EHR. One approach her team has taken has been to provide the patient with an iPad or laptop so that the patient can answer screening questions confidentially.

Cooper then asked if the panelists have support groups for their work, and Rowhani-Rahbar replied that part of the critical time intervention engages a patient's support network to the extent possible. He said that he and his team have learned much about the role that mothers play in supporting many of the youths in the program. Cunningham stressed the importance of having support groups for program staff as well as for the participants.

Woodie Kessel from the Koop Institute at Dartmouth asked the panelists where the best opportunities for intervention are in terms of return on investment and where the best opportunities for scale-up exist. Regarding the first question, Cunningham said it is important to invest in a number of programs simultaneously, including resiliency-building components in communities or Project Ujima's summer camps, in order to have the best chance of interrupting some of the early events that occur before guns become involved. Fischer added that investing in research networks would spur a great deal of activity. Levas, replying to the second question, said that identifying a strong adult in a child's life plays an important role in getting a positive outcome, so his suggestion for scaling is to push an agenda that gets strong, innovative, smart-thinking community members involved in large numbers.

Daniel Webster commented that what has changed over the past 20 years is not the number of households with guns in them but instead the number of people walking around and driving around with guns in their possession. This, he said, is a new challenge that needs to be addressed, in addition to gun safety in the home. Beidas said she hopes that it will be possible to identify creative solutions for this new issue by working in partnership with gun owners. Cunningham added that research is needed to understand who is at a particularly bad or unstable moment in his or her life to be carrying a gun.

Meredith Wadman from *Science* magazine asked Beidas if she could explain why only 2 percent of the doctors in her study were routinely handing out gun locks, given that doing so does prevent suicides. Beidas replied that the reasons the physicians gave were mostly about operational concerns—who would pay for the gun locks, where would they be stored, how would they be distributed, who would teach people how to use the gun locks—rather than worries that they would offend parents by suggesting they lock their guns. In fact, she said, parents were excited about getting something free at the doctor's office.

8

Developing Networks and Sharing Information

The workshop's penultimate session featured two presentations on building networks and sharing information. The two speakers were Gregory Simon, a senior investigator at Kaiser Permanente Washington Health Research Institute and a principal investigator with the Mental Health Research Network; and Linnea Ashley, the training and advocacy director for Youth ALIVE! and the managing director of the National Network of Hospital-Based Violence Intervention Programs (NNHVIP). An open discussion moderated by George Isham followed the two presentations.

BUILDING A LEARNING HEALTH CARE SYSTEM FOR SUICIDE PREVENTION

The Mental Health Research Network, Simon explained, comprises 13 large, integrated health care systems and their affiliated or embedded research centers which together serve some 14 million Americans. Aside from providing comprehensive care, these integrated health systems also provide insurance coverage, and all have longitudinal electronic health record (EHR) and claims data harmonized into compatible data sources. Simon said that the presence of strong partnerships between the delivery systems and health plan leaders in each of these health systems is probably the most important asset to the network's members.

Work on suicide prevention, Simon said, began less than a decade ago in direct response to a question from the network's health system partners. At the time, the network's health systems were engaged in an effort to improve mental health care using systematic outcome measures, one of

which was a score on the Patient Health Questionnaire-9 (PHQ-9) depression questionnaire. What providers wanted to know was if their patients were at risk of suicide attempt or death if they answered in the affirmative that they had frequent thoughts of death or self-harm. The answer then was that nobody knew the answer, so the research network decided to address that question, and the answer was that those patients who reported having thoughts of death or self-harm nearly every day were 8- to 10-fold more likely to either attempt suicide or die by suicide over the year following the visit when they had completed that questionnaire. The data collected showed that some 6 percent of patients reported they had thoughts of death or self-harm nearly every day or more than half of the days and that this 6 percent of the patients accounted for 39 percent of the suicide deaths.

This led to three sets of responses, Simon said. First, the health system partners rapidly implemented a standard-of-care process because they did not want to wait for further evidence before acting. The process consisted of providers administering the Columbia Suicide Severity Rating Scale instrument and, if the score indicated a significant risk, the care team creating a safety plan addressing lethal means, including a routine assessment of access to firearms, and recording that in the EHR. This process, implemented in 2014, was supported by provider training and tools embedded in the EHR. By 2015, health systems were monitoring provider performance and using it as part of physician performance-based compensation. Simon said that in the past 3 months of 2015, he scored at only the 83 percent level, which would have led him having his pay docked by $233 in that particular quarter. "So although I am not proud of my personal report card, and I will tell you it has improved since that time," he said, "I am very proud of our health system in terms of a 22-month gap between publication of findings and implementation to the stage where the first author of the publication is going to get his pay docked if he does not improve his performance."

Today Kaiser Permanente, along with the Henry Ford Health System in Detroit and HealthPartners in Minnesota, is leading a national implementation effort following the National Action Alliance for Suicide Prevention's zero suicide model (Brodsky et al., 2018; Labouliere et al., 2018). The steps of this model, Simon explained, include identifying people at risk, engaging people in ongoing care, providing evidence-based or empirically supported interventions, and attending to transitions between the sectors of care, such as hospital to outpatient or from emergency department to outpatient follow-up. He said that the network is "fairly far along" in developing specific metrics to assess the desired changes in care process as well as both intermediate and ultimate outcomes. These metrics will be monitored in six health systems serving some 9 million members over the next several years and will be used to provide feedback that allows individual providers,

clinic managers, and researchers to assess the specific effectiveness of different improvement programs. The metrics will also make for relatively transparent comparisons among the performance of each of the health systems over time.

The second response involves the network looking at the potential benefit of more intensive programs or more intensive outreach programs to people who become disconnected from care. These programs would not be trivial to implement in terms of cost and potential intrusiveness, Simon said, and thus they would require more evidence to support wide-spread implementation. To get that evidence, he said, the network is undertaking a large trial in four of its health systems that assigns patients who completed a PHQ-9 and reported frequent thoughts of death or self-harm to a usual care control arm or one of two population-based interventions. Both interventions involve outreach to supplement, not replace, usual care, and the programs are delivered primarily by online messaging and telephone, which means they could be scalable and affordable should the data support their effectiveness. One of the interventions emphasizes training and dialectical behavioral health therapy skills, while the other is a more traditional care management program aimed at keeping people engaged in mental health care. Enrollment and randomization of 18,900 people across the 4 health systems is complete, Simon said, and the intervention will continue until the middle of 2019, with findings expected in late 2019 or early 2020.

The third response of the network's suicide prevention research efforts has focused on developing a machine learning method to predict suicidal behavior that is better than the PHQ-9, which produces a 7-fold risk concentration and misses the 35 percent of the people who commit suicide but do not report having thoughts of death or self-harm. This does not include those individuals who are missed because they never complete the PHQ-9. This project, Simon said, involved mining EHR data from seven of the network's members.

Simon explained that the research team developed separate models for people who visited specialty mental health providers and for people who visited general, medical, or primary care providers but had a known mental health condition. The team linked those models to data from records about nonfatal suicide attempts within 90 days and state mortality records about subsequent suicide deaths. From past mental health and medical diagnoses and service use patterns this analysis defined approximately 150 potential clinical predictors and 200 possible interactions among them.

The model to predict suicide death following a mental health specialty visit uses 62 predictors and has an overall accuracy of approximately 86 percent, while the model to predict suicide death after a primary care visit uses 43 predictors and has an overall accuracy of approximately 83 percent.

Similar predictors were selected for nonfatal suicide attempts, Simon said. He added that this approach accomplished a 10-fold risk concentration—that is, it identified a set of individuals who made up 5 percent of the group of patients in the study but who accounted for 48 percent of the suicide deaths—and missed fewer events in the bottom 75 percent of people, who accounted for less than 20 percent of the suicide deaths.

These finding have initiated another cycle of implementation and effectiveness research and looking for new methods, Simon said. "These risk prediction models will be used to augment the previous standard work processes," he explained, with Kaiser Permanente in Washington and Northern California adding these risk scores to the EHR. The models will also be used to do outreach between visits to people who either cancel a visit or fail to show up for a visit using the ability to recalculate risk scores daily on every member in its service population. Simon noted that the technical tools to develop and validate the models are in a public GitHub repository.[1]

Going forward, Simon said, the network is planning a large trial to determine if one of the new glutamate receptor modulator ketamine-like drugs, which have been shown to rapidly decrease suicide ideation, actually reduce the risk of suicide attempts and suicide deaths as well. The network is also harvesting another round of data to improve the prediction models, is adding more predictors, and is using more detailed encoding about timing. It will also extend its risk prediction work to develop models for people seen in emergency departments or people discharged from hospital, and it will look at linking EHR data to location-based data and financial data because those are known to be important predictors of suicidal behavior.

In closing, Simon offered some lessons learned in terms of building and operating a research network in the world of integrated health care systems that are responsible for defined populations and that routinely link membership data to data on injury and poisoning mortality, which, he observed, is the only way for a health system to hold itself accountable. Simon said that data harmonization is critical for rapid turnaround for data analysis and for systematically assessing data quality. Highly skilled data analysts are probably the most important resource, he said, while building reusable data tools eliminates building new models from scratch. "Finally," he said, "the most important key ingredient is culture. We always are engaging with health system leaders who are committed to systematic improvement and see systematic measurement and accountability as core to their mission," and in that respect, the importance of transparency and trust cannot be

[1] See github.com/MHResearchNetwork for more information (accessed December 20, 2018).

overstated. "It was not easy to get to the point of health systems saying we are going to come together and transparently share information about how many people die by suicide and whether we did the right thing by them before they died," he continued, "but we are at that point now, and that is incredibly valuable in terms of quick learning."

As a final comment, Simon noted how deaths from lightning strikes have plummeted since the 1940s, but not because humans figured out a way to eliminate thunderstorms. "What we did was we got better at predicting risk and developed effective public health messages," he said. "Taking that as an example, how do we identify time, places, and situations of high risk [for suicide], and how do we develop effective messages for people at risk to avoid dangerous things and go to safe places? Those are fairly simple messages."

VIOLENCE INTERVENTION AND COLLABORATION

Building networks and collaboration is important for both research and the dissemination of best practices, Ashley told the workshop. Network composition influences the type of research that is being done, the information being included, and the collaborators at the table. In addition, networking and collaboration open doors to new approaches to addressing entrenched problems such as gun violence and injury. "As long as we are working in silos," she said, "we are going to continue to see problems the same way that we have always seen them and see solutions the same way, and if we want to get innovative, if we want to do new things, we are going to have to make friends."

Hospital-based violence intervention programs (HVIPs), which by design require collaboration among different members of a health care team, are at their core efforts to promote positive alternatives to violence. HVIPs are not alone, as there are other organizations, such as law enforcement, that have similar goals, although they take a different approach to confronting violence. Given that each organizations' methods may differ, it is important when forming networks with these other organizations to keep in mind the common goal when inevitable differences of opinion or even personality conflicts among collaborators arise, Ashley said.

Because communities affected by firearm violence are at the forefront of the problem, it is imperative those communities be involved in any network or collaboration, she said. In fact, Ashley urged that members of those communities be involved in the next workshop convened on this subject. "When we are talking about solutions, when we are talking about the problems, it is imperative that they be in the room, and that they are able to talk about their own experiences, and when we come up with potential solutions, that they are on board or that they are able to bring their own solutions,"

Ashley said. Nonprofits and community organizations are also important collaborators, she added, "because those are the groups that have been doing the work before funding was available and will continue to do the work if everybody else's attention pivots to another problem."

When looking for collaborators, universities are good places to start, she said, because they have students who are eager to be involved in research designed to address gun violence and injury and who will then join the workforce with connections already formed to people and organizations outside of the university. Other places from which to identify potential collaborators include national organizations such as the Brady Campaign and a variety of local community and state organizations. Ashley encouraged people to look for some level of overlap in a potential collaborator who on the surface may not appear to share the goal of addressing firearm violence.

Partnerships can be flexible, Ashley said, but they do have certain ground rules. It is important for all partners to know their roles in the collaboration, stay in their own lanes, learn to trust one another, and learn from one another. While the overarching goal of all collaborators will be to reduce gun violence, she said, other goals can be involved, such as wanting to reduce community tension and improve community safety and dialogue or a desire to expand research or expand the reach of a small program.

Partnerships, Ashley said, change perceptions because they help break down silos. "When you partner with somebody else and look at the work that they are doing, it can expand your idea of what is both possible and also where your work might fit in with somebody else's work," she said. She added that partnerships succeed when the collaborators trust one another, so it is important to include trust-building activities into a collaboration. For example, the annual Health Justice Alliance Conference now includes a pre-conference fun day that allows potential collaborators to interact with one another in a way that encourages and nurtures relationships built on trust and connection.

In building a partnership it is important to consider the barriers to working relationships between systems. For example, Ashley said, Youth ALIVE!'s Caught in the Crossfire program, an HVIP, works with the police but is mindful of the way in which it works with law enforcement because some clients may not react well to frontline staff who appear to be too closely tied to law enforcement. "We have to set clear boundaries so that everybody knows what information is being shared," she said. At the same time, working with the police provides a number of advantages, such as having easy access to police reports having to do with clients. "You just have to think about the benefits and boundaries and be respectful on both sides," she said.

In the HVIP world, networks can streamline research by creating large pools of subjects from the many small HVIP programs that exist. Networks

also create natural opportunities for sharing the results of experiments, spreading best practices, and benefitting from experience that other programs have gained in their communities, Ashley said. Conferences and working groups associated with networks can be valuable places for getting exposed to new ideas, making new contacts, sharing best practices, learning about challenges that other programs face, and expanding the reach of successful programs. For example, she said, the best practices that have been discussed at the national conference of the Healing Justice Alliance include treating violence as a public health issue, the value of HVIPs, the need to involve prevention professionals, the importance of listening to communities, and the role that trauma-informed care and mental health services can play in preventing gun violence. Other best practices that Ashley listed include not dismissing practice-based evidence generated by groups working in the community that may not hit the gold standard of research, particularly regarding culturally specific practices; implementing both screening and interventions, because just screening for the problem is not helpful; and making research applicable to the community.

In closing, Ashley briefly discussed a tool that Youth ALIVE! developed called the Screening and Tool for Awareness and Relief of Trauma, a six-question screen that pulled from other available screens. Based on how people answer the questions, she said, there are four brief interventions they can receive in addition to a psychoeducation piece on the common symptoms of trauma. The interventions include a breathing exercise for relaxation, hand massage for relaxation and grounding, a sleep hygiene awareness exercise, and a safety plan. The goal for having these brief interventions, Ashley said, was to be able to deliver something immediately and not merely refer an individual to a later session that the person may or may not attend.

DISCUSSION

When asked to describe their respective networks, Simon answered by saying that the Mental Health Research Network is not tied together by a defining passion for any one particular issue. In fact, he said, the network did nothing on suicide prevention until health system leaders asked the network to address that problem some 6 or 7 years ago. In contrast, Ashley described the National Network of HVIPs as including a broad range of people with overlapping interest in a single overriding issue—violence prevention and intervention—although that does not prevent the network from working on related issues.

Isham asked Simon if the Mental Health Research Network would be able to disseminate research findings and solutions, and Simon replied, yes, it could, with some work. Given the research emphasis of this group, he

said, it would have to be sure the quality of the data was good enough to disseminate a finding widely. He did say that the network is starting to build relationships with leaders in health systems who are responsible for service delivery, in addition to its relationships with leaders of mental health and primary care specialties.

On the topic of "translating research into practice," Simon said he finds that phrase an abomination that should never be spoken again. Research must live in practice and take orders from practice, he said. "Research must know that its bosses are practitioners and the people those practitioners serve. If that happens, I do not think that much translation is necessary." Ashley said she agrees with that idea in theory, but that there is a big gap between what happens in academic research and what happens on the ground. She noted that the NNHVIP is set up so that researchers and frontline workers are in close proximity to each other in real time in order to avoid looking for theoretical answers to theoretical questions that do not have any immediate bearing on the challenge of reducing violence in the community.

Isham then asked the two speakers if networks make it easier to use machine learning to extract useful information from large datasets. Simon replied that predicting suicide death, which is a relatively rare event, would require large datasets to make good predictions. Predicting suicide attempts would require a smaller dataset, and predicting suicidal ideation an even smaller dataset. However, scale does not always translate into generalizability because predictions generated in one place may not generalize to another. For the work that he and his colleagues are doing, he said, the more important factor about being part of a network is that the data come from multiple health systems spread across the United States, so the sample set is diverse in terms of socioeconomic status, race, and ethnicity. Ashley agreed that generalizability is an issue because every community is unique. What is generalizable, she said, is the threshold level of violence in a particular community that makes having an HVIP beneficial and, for those concerned about money, also cost-efficient.

Therese Richmond noted that Simon's group has an advantage in that Kaiser Permanente, as both an insurer and provider, has a captive member population, so even if a Kaiser member is treated outside of the system, it still gets information back to add to a member's EHR. Simon agreed and said that every health care system should have a link to mortality records, as that is the worst possible outcome. He also commented that he was unsure if the prediction methods he spoke about could be extended to prediction of being a victim of either accidental firearm injury or firearm injury by assault. "Those things may be more unpredictable, but that is an empirical question that we could certainly answer with the data, and we plan to do that," Simon said. On the other hand, he continued, being a perpetrator

of violence may be more predictable than being a victim, although Kaiser does not have access to data showing who among its members have been perpetrators of violence. While there is no technical barrier to linking its membership data to criminal justice behavior, Simon said, the sensitivity of doing so is high, and today Kaiser is in a deliberative process of discussions with its members about when it is all right to use that kind of data. Ashley added that it is important to be mindful of the fact that perpetrators and victims often change places, in that people who experience violence can go on to inflict violence on others. This dynamic can affect how people are treated within the hospital system and whether they will continue accessing services, she said.

Isham then asked Simon and Ashley if they knew what percentage of Americans their networks covered. Ashley could not say, but she noted that the American Hospital Association joined the network in the past year, so the network now covers a much larger portion of the population than before. Now, more hospital systems are aware that there are approaches for addressing violence in the community, and as a result, Ashley said, she receives a large number of calls from hospitals and community groups wanting to establish a full-fledged violence prevention program. Simon said that his network covers approximately 4 percent of America, which he said is "big enough to do a lot of fancy math, but 4 percent of America is not big enough to change health care." This latter realization has the Mental Health Research Network considering how to collaborate more with people and organizations that are not just like Kaiser Permanente, he said.

An unidentified participant asked if either of the two networks work with clergy or faith-based organizations, given that these are typically among the most trusted members of the community. Ashley said that some of the network's individual programs have established relationships with clergy. One non-member effort in San Diego, for example, was using clergy as its initial contact point with individuals, but there is not a formal arrangement between the national network and any particular faith-based organization.

In response to a question about the use of "prevention professionals," Kyle Fischer explained that the idea behind creating that title was to provide a means for health systems to recognize an intervention specialist who comes from the community and who does not fit into any existing category in the current medical model. "The long and short of it is, public health does not pay, so if we are going to try and pay for these services, it is going to have to be through the traditional medical model," Fischer said. The national network, Ashley added, is currently refining a 35-hour certification curriculum for prevention specialists.

Fischer said that while there may be similarities between prevention professionals and community health workers—and in some states, com-

munity health workers and prevention professionals could be the same person—he and his collaborators decided to develop a new classification out of frustration with the fact that every state has a different definition for community health workers and different rules on how to pay them. His position is that if a person lives in a state that pays for community health workers, then that person should be a community health worker and get trained in the core competencies for prevention. Otherwise, the prevention professional pathway can serve as a new pathway for payment. Ashley reiterated the importance of getting the specific training needed to be able to serve as a prevention professional even without that formal title.

When asked how their networks are funded, Simon said that his network has been funded for about 7 years by the National Institute of Mental Health (NIMH). He said that the infrastructure budget for the network across 13 sites is just under $1 million per year, including what are known as indirect costs. The coordinating center's annual budget is a few hundred thousand dollars, and each participating site receives a sustaining budget of approximately $60,000 per year. Research projects receive separate funding through individual research grants that network members submit. The case that Simon can now make to NIMH is that the network's established infrastructure is able to conduct less expensive large clinical trials. For example, a pragmatic trial of interventions to prevent suicide attempts enrolled 19,000 people at a per person cost of under $400, which is two orders of magnitude less than that of a typical NIMH-funded trial of a similar size and nature. "We can do big randomized trials at a cost of about 1 percent of what you are used to paying, and we are proud of being cheap," Simon said.

Ashley said that her network gets some funding from Kaiser for her position, but the majority of the network functions on volunteer hours and with money from membership dues. She said that the network has received some federal funding in the past and expects to receive some federal funding in the year ahead, but for the most part the network has been held together by volunteers and organizations who believe in its mission.

9

Developing a Culture of Health Care Providers as Interveners

In the workshop's final session, three speakers gave short presentations before Stephen Hargarten moderated an open question-and-answer session. The three speakers were Jay Bhatt, a senior vice president and the chief medical officer at the American Hospital Association (AHA), the president of the Health Research Education Trust, a practicing internal medicine physician at the Erie Family Health Center (Chicago), and a faculty member at both the Northwestern University Feinberg School of Medicine and the University of Michigan Medical School; Deborah Kuhls, a professor of surgery, trauma, and critical care and the program director of the surgical critical care fellowship program at the University of Nevada, Las Vegas, School of Medicine, and the chair of the American College of Surgeons Committee on Trauma Injury Prevention and Control; and Shannon Cosgrove, the director of health policy at Cure Violence.

HOSPITALS AGAINST VIOLENCE INITIATIVE

Bhatt began his presentation with a story—one that he said crystallized for him the importance of preventing firearm violence—about a 17-year-old boy shot dead while walking home from school one winter evening. The boy had no gang affiliations and was struck by a stray bullet fired during a fight between two rival gangs. The perpetrator, his tough guy façade gone, sits home afterward, alone, afraid, and in pain. The boy's family, meanwhile, deals with an unfathomable grief and medical bills from their son's treatment. Dad has to take a second job to pay those bills and spends little time at home, while the victim's mom, once adherent to her blood pressure

medication, can no longer afford the cost of the drugs and is too paralyzed with grief and depression to care much about her own health. The victim's sister, once an honor student, is failing her classes and may not graduate to the next grade. Six months after the boy's death, the family wonders how long it will take for them to feel whole again.

This story, played out across the nation in different ways, encapsulates the message repeated throughout the workshop, Bhatt said—that there is a gap in longitudinal support and that interventions can help not only individuals, but their families as well. Given the urgency of addressing this problem, he said, the challenge is not just developing new interventions, but identifying steps that can be taken today to advance the work of firearm injury prevention.

Bhatt said the goal of AHA's Hospitals Against Violence (HAV) initiative is to do just that: to share leading practices and examples across the field, with a particular emphasis on youth violence prevention, workplace violence prevention, and combatting human trafficking. AHA has developed a library of resources, interventions, and case studies, but it is the peer community sharing that will amplify this initiative, he said. Toward that end, AHA launched the first national day of awareness, called #HAVHope, in June 2017. #HAVHope is a social and digital media campaign that brings together hospitals and health systems around the country to share their stories and their collective efforts. In March, the HAV initiative hosted a national convening of human trafficking experts to discuss health system interventions to address this public health crisis and to continue to advise and inform programs and educational offerings. Additionally, HAV and AHA's Coding Clinic, joined by experts from Catholic Health Initiatives and the Massachusetts General Hospital's Human Trafficking Initiative and Freedom Clinic, worked to develop *International Statistical Classification of Diseases and Related Health Problems, 10th revision* (ICD-10) codes to identify human trafficking. Effective in fiscal year 2019, unique ICD-10-Clinical Modification (CM) codes are available for data collection on adult or child forced labor or sexual exploitation, either confirmed or suspected.[1] These efforts will assist in identifying victims and improving the health systems that serve these patients and the community.

In thinking about the role that hospitals and health systems play in violence prevention, Bhatt said, it is important to consider that they serve as anchors for communities that can think about broader upstream issues, provide leadership and partner with governance, and take a community health needs approach. AHA created a community health needs assessment

[1] See https://www.cdc.gov/nchs/icd/icd10cm.htm (accessed December 27, 2018) for more information about the *International Statistical Classification of Diseases and Related Health Problems* (ICD) codes.

finder, a dynamic Web tool that allows hospitals and health systems to come together on shared community health needs, including violence prevention, Bhatt said. Because hospitals and health systems are large employers—sometimes a community's largest—they can serve as drivers of opportunity to create community partnerships and a community-based research agenda that promotes trauma-informed, evidence-based prevention programs.

To illustrate some of the ways in which hospitals and health systems can drive violence prevention efforts, Bhatt discussed some case studies. One is the Detroit Medical Center's Detroit Life Is Valuable Everyday (DLIVE), which was created to address the fact that homicide is the leading cause of death for Detroit residents ages 15 to 34 and that the rate of violent injury recurrence at the city's trauma centers is as high as 30 to 45 percent. By treating violence as a chronic disease, DLIVE has reduced the violent injury recurrence rate to zero among the 70 participants who have gone through the program in the past 18 months. In addition, the 80 percent of participants who had not finished school are now enrolled in education programs or have jobs.

In Chicago a new program, called Chicago HEAL, has brought together health care and legislative leaders to identify actionable and quantifiable areas related to the issue of firearm injury prevention and research. Some hospitals are addressing issues of jobs employment, while others are working on trauma-informed care training for the communities they serve. Collectively, Bhatt said, these hospitals are pooling resources and lessons to address gun violence in Chicago.

One issue that confounds violence prevention efforts is that a victim may get treated at a hospital outside of their primary care team's network, and so the care team has no idea that their patient was injured. Electronic admission discharge transfer information is one technology that may be useful in addressing this problem, Bhatt said. Furthermore, predictive models and the use of clinical decision support can help engage clinicians inquire and potentially take action to prevent and reduce firearm injury.

CONSENSUS-BASED FIREARM INJURY PREVENTION STRATEGY

Across the United States, more than 500 trauma centers, verified by the American College of Surgeons, stand ready to treat the most seriously injured patients. Kuhls said all verified trauma centers are required to keep a trauma database of everyone who is admitted and these databases contain a wealth of information, largely on injuries and outcomes. Given that situation, Kuhls recommended that hospital-based violence intervention programs (HVIPs) should explore using this database as a repository for their data, given that it represents a well-developed, existing infrastructure.

Other requirements for trauma centers include that they implement

evidence-based injury prevention programs that address the main causes of injury-related death in the area they serve and that they hire an injury prevention specialist. Kuhls said the American College of Surgeons and other organizations offer an education and certification program for injury prevention specialists who come from a variety of backgrounds. One area in which many trauma centers could improve, she said, would be to get a better understanding of the mechanisms of injury for those individuals who never make it to the hospital because they go directly to the coroner and to include this information in their injury prevention plans.

Today, the American College of Surgeons, through its Committee on Trauma, is taking a public health approach to address the public health crisis of firearm violence. Given how controversial and divisive the topic of firearms can be, the organization first surveyed its leaders in trauma surgery to find out their opinions on firearm injury prevention and advocacy; a survey of all 80,000 American College of Surgeons members was just completed and its results were being awaited at the time of the workshop. The initial survey, which received more than a 90 percent response rate, revealed that:

- trauma surgeons felt that violence is the root cause and is a major problem in the United States,
- reducing firearm injuries and deaths should be a top priority for the American College of Surgeons,
- health care professionals should be allowed to talk with their patients about how to prevent firearm injuries,
- the federal government should fund research on firearm violence, and
- the trauma community should partner with mental health to address the mental health components of firearm injuries and death.

Based on the survey of trauma surgeon leaders, the Committee on Trauma developed a nine-part strategy which included signing a memorandum of understanding with the National Network of HVIPs, creating a primer on HVIPs, spreading the word about the efficacy of HVIPs, and having trauma surgeons commit to talking to parents who own guns about how to keep their families and friends safe. To help with this last task, the Committee on Trauma published a brochure on gun safety and health that stresses being proactive about protecting those in the home by safely storing guns and ammunition. Kuhls and her colleagues are now piloting a tablet-based program on gun safety in the home targeted at pediatrics patients and their parents or guardians, and while the organization does not currently give away safety devices, it is exploring that possibility. Kuhls added that the organization is going to take its plan to other health care organizations to see if they would like to join this effort.

An important piece of this initiative is to build a public consensus to reduce firearm death and injury by working together, understanding and addressing the underlying cause of violence, and making firearm ownership as safe as possible. The American College of Surgeons has adopted the motto "Freedom with Responsibility" and issued its consensus strategy for preventing injury, death, and disability from firearm violence (Stewart et al., 2018). The American College of Surgeons is also actively engaging a group of surgeons who are avid, vocal firearm owners. This group provided input that guided the development of this brochure and then endorsed it. "We find that engaging them really helps to make us successful," Kuhls said.

Going forward, the Committee on Trauma is developing a recommended, comprehensive research agenda, she said, although it is taking its time as this is something new for the organization.

THE CURE VIOLENCE APPROACH

To begin the final presentation of the day, Cosgrove said she wanted to add one datapoint to the discussion, one that was first identified in a 1985 report from then Secretary of Health and Human Services Margaret Heckler (Heckler, 1985): when looking at the largest health disparities between the Black and white population in the United States, the disparity in homicide rate was the worst of all, at 400 percent higher for Black Americans than white Americans. When health disparities were examined again in 2013, that disparity had risen to 470 percent higher, while the gap between the Black population and white population on most other health issues had decreased. The reason that she cited these figures, Cosgrove said, was that the health system has not invested as much in reducing disparities in homicides as it has in other areas, such as cancer and diabetes. That lack of investment and lack of a comprehensive health system has allowed the epidemic to spread, she said.

With that as background, Cosgrove explained what Cure Violence does as an organization. Founded in 1999, Cure Violence was intended to replicate the World Health Organization's three-pronged approach to epidemic control, which involves interrupting transmission, working with those at highest risk to change behaviors, and changing community norms. Cure Violence founder Gary Slutkin, who previously served as an epidemiologist with the World Health Organization, conducted a pilot program in Chicago using this three-pronged approach. Specifically, the three prongs were (1) interrupting transmission, which involved preventing retaliations, mediating conflicts, and keeping conflicts cool; (2) reducing the highest-risk behaviors, which entailed assessing who is at highest risk, changing their behaviors, and providing appropriate treatment; and (3) changing commu-

nity norms, which was focused on responding to shootings, organizing the community to take action, and spreading positive norms.

When the Cure Violence model was first implemented in Chicago, it resulted in a 67 percent reduction in shootings. The program expanded and was then replicated in Baltimore, where it also resulted in large reductions in shootings and killings. Since then, the Cure Violence program has been implemented in more than 100 communities across the United States and 20 additional communities around the globe. Cure Violence's main focus is working with credible messengers, that is, individuals who have access and credibility among those at highest risk for violent behavior. The program hires these individuals and trains them to support fellow community members who are at the highest risk of becoming involved in violence.

According to independent evaluations, Cure Violence has resulted in reductions as high as a 73 percent drop in shootings in communities in Chicago, 43 percent in communities in Baltimore, and 63 percent in communities in New York, which had just experienced a full weekend without a shooting just prior to the workshop. "We are seeing these numbers translate across the world, in places like San Pedro Sula, which was previously the most violent place in the entire world," Cosgrove said. The most recent evaluation in New York City also revealed an increased level of trust between the police and the community and indicated that the positive impact of the program had spread into surrounding neighborhoods.

Norms overall are changing, too, Cosgrove said. "We are seeing tremendous reductions in one's likelihood of being involved in violence," she explained. The most recent evaluation in New York found that the more times someone was interacting with a credible messenger or seeing the program messages overall, the lower the likelihood that person would be involved in violence or even think about being violent in the future. Perhaps the most striking results have been in the city's Queensbridge Houses, the largest public housing development in the country comprising 96 buildings spread across 6 blocks, where there have been no shootings or homicides for more than 1,000 days.

Cure Violence is not the only successful program for reducing gun violence using health approaches, Cosgrove said, but unfortunately these different programs are not working together to figure out how to integrate their work and create a comprehensive system for violence prevention. To address that shortcoming, Cure Violence started the Movement towards Violence as a Health Issue, which has five goals:

1. Develop common understanding and language to convey the message that violence is a health issue.
2. Increase policies, including sustainable funding, to support health approaches to violence prevention.

3. Increase the use of health and community systems to prevent violence.
4. Advance racial and health equity.
5. Develop multi-sector partnerships and coalitions.

The movement has support from Congressional officials, the leaders of health care agencies, public health institutions, and more. With more than 600 members and leadership from Slutkin; David Satcher, the former U.S. Surgeon General; and Alfred Sommer, the former dean of the Johns Hopkins Bloomberg School of Public Health, there is momentum building toward seeing violence as a health crisis, believing that health leaders need to take on this charge, and understanding that interventions exist that have proved effective. The movement has developed multiple briefing documents and toolkits and also produced a framework for the health system to prevent violence (see Figure 9-1), which includes best practices across the United States to prevent all forms of violence. The framework lays out an integrated approach across all sectors highlighting the need for shared data and protocols to prevent violence and to heal individuals affected by violence—"not just healing within the hospital walls or reducing risk immediately," Cosgrove said, "but ensuring people have the chance to heal within their community to be free from violence."

This initiative is seeing success, particularly in terms of growth in investments in violence prevention, Cosgrove said. Much of the new money has come from the Department of Justice, and Cosgrove questioned why the nation's health agencies are not funding these efforts at levels in line with the need. Working with Representative Mike Quigley (D-IL-05), who represents part of Chicago, Cosgrove and her colleagues designed H.R.2757, the Public Health Violence Prevention Act, which would amend the Public Service Health Act to establish a National Center for Violence Prevention and provide $1 billion to be invested in implementing health approaches in communities across the nation. Cosgrove explained that the hope is that this bill will be reintroduced after January 1, 2019. Maryland, meanwhile, passed the Public Safety and Violence Prevention Act of 2018. Cosgrove explained that this act incorporates much of what was in the federal bill and allocates $5 million to public health departments, hospitals, government agencies, and community-based organizations to integrate evidence-based violence prevention health approaches statewide.

DISCUSSION

Stephen Hargarten opened the discussion period by asking the panelists to discuss the cultural challenges that health care systems and various organizations working in communities face in their efforts to be actively

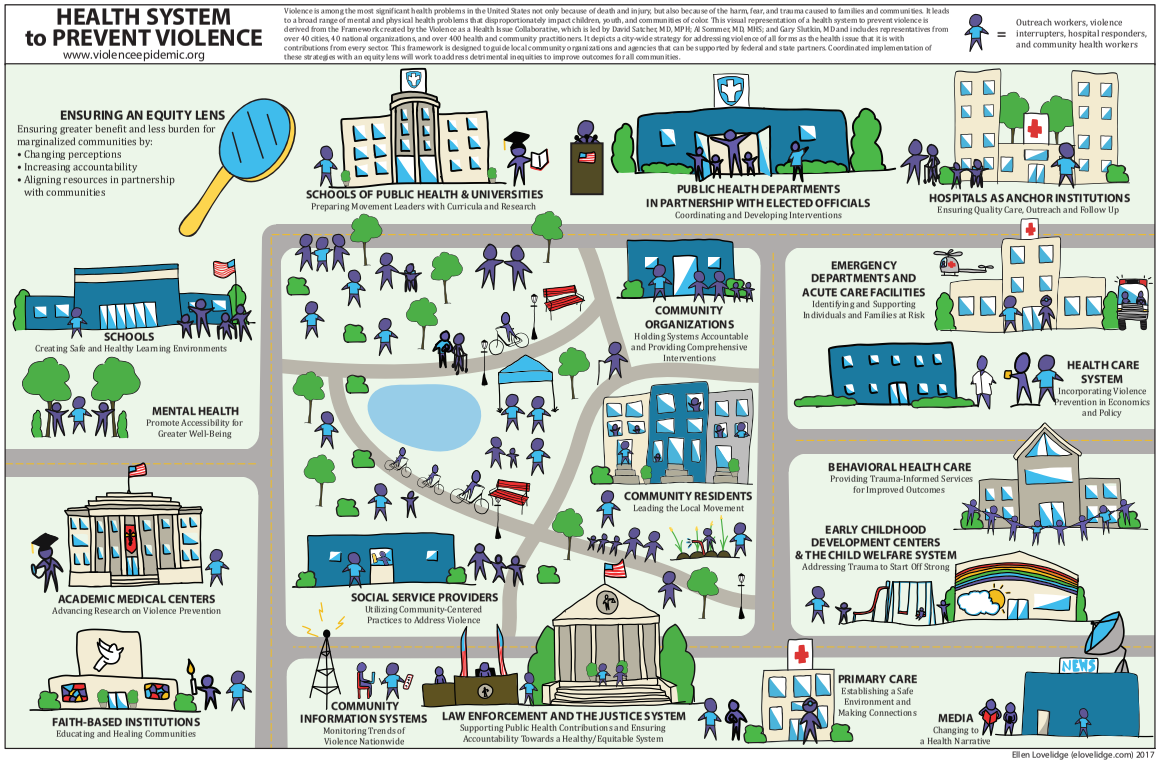

FIGURE 9-1 A framework for creating a health system to prevent violence.
SOURCES: Figure presented by Shannon Cosgrove at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 18, 2018. Created by Ellen Lovelidge for Cure Violence (Cure Violence, 2017).

engaged in firearm violence research and intervention. Bhatt replied that health care systems have been in a sick care system and only recently have had incentives and opportunities to effectively work upstream. Part of the challenge, he said, is finding the resources to engage more in the community and to address upstream factors that lead to violence, particularly in rural communities that are being affected by reduction of access points.

At the same time, he said, the Patient Protection and Affordable Care Act (ACA) created opportunities for value-based care that create a potential channel for investing in violence prevention. In his opinion, Hargarten said, delivery systems need help reorganizing their resources and their approach to violence prevention so that it includes training staff to ask the right questions and use the electronic health record to document cases involving violence. Bhatt said that the American Hospital Association (AHA) is now helping hospitals and health systems have conversations with community partners to help rebuild trust within the community.

Kuhls said that she sees trauma centers as a model that could be expanded nationwide with additional funding, noting that trauma centers exist nationwide and that they are required to partner with community organizations in injury prevention. One of the challenges is that there are what Kuhls called "trauma center deserts" throughout the country, but she noted that there are other health systems, such as the Veterans Health Administration (VHA) and active military installations with medical facilities, that share many of the same firearm injury and prevention challenges in their patient populations and could be important partners. Cosgrove added that an important and needed culture change would be to treat violence as a health issue rather than solely a law enforcement issue. In her opinion, she said, there are not enough health leaders promulgating that message.

Bhatt commented that there are a number of challenges to implementing and scaling effectively that stem from the importance of contextual differences at sites of implementation. Kuhls pointed to the shortage of sustainable funding to do implementation science and the importance of engaging those who have been the victims of violence when preparing to implement a program in a new region. Both funding that is not sustained and a lack of consistent leadership advocating for funding affects community trust negatively, she said. When a grant vanishes, those trusted members of the intervention team lose their jobs and the community loses a valuable resource.

Bhatt agreed that the community needs to advocate for increased and sustained funding, but it also needs to be innovative in how it uses the resources it has. For example, firearm screening could be bundled with lead paint screening, given that both can have long-term effects on children. Technology such as telehealth can also help leverage limited resources

and limited personnel, particularly in doing longitudinal work focused on violence.

In response to a question about the kinds of levers health systems could use to address gun violence, Bhatt said that there are workforce models that would help deliver desired outcomes, including data-driven interventions in the emergency department for behavioral therapy interventions to be delivered for every victim of violence. Cosgrove said that the ACA's required community health needs assessments could provide such a lever, but a recent review by Kyle Fischer and colleagues of hospital needs assessments in the 20 most violent U.S. cities found that although 74 percent of those assessments included violence or assault, those were just mentions or a single data point (Fischer et al., 2018). In fact, in only 32 percent of those cities had health systems integrated those health assessments into their plans to spend community benefit dollars, and most of those health systems already had HVIPs. The challenge, Cosgrove said, is holding health systems accountable for using the community health needs assessments to implement violence intervention programs. She cited Louisville, Kentucky, as an example of a city doing just that in coordination with their health department.

Bhatt said the nearly 5,000 members of AHA are trying to figure out ways to address the social determinants of health. What appears to work well, he said, is applying what hospitals and health systems do well in terms of systematic quality improvement to the social determinants of health. He noted, too, that all 50 state hospital associations have signed onto AHA's equity of care campaign, which has nearly 1,700 hospitals taking targeted steps to reduce inequities. "The journey to zero is possible there, and it is something that we can continue working toward," Bhatt said, referring to the Institute of Medicine report *To Err Is Human* and its call to reduce hospital-based errors to zero (IOM, 2000).

An unidentified participant asked if the National Academies would consider holding a workshop that would focus on translating the VHA's model for trauma treatment into the civilian sector. Hargarten supported that idea. He then noted that a city can request the Centers for Disease Control and Prevention (CDC) to investigate the causes of the violence killing people in its community. "That is a little-known public health assessment that also may provide information to health care systems about what they can additionally do to address an outbreak in their city," Hargarten said.

A workshop participant asked Cosgrove how she responds to people who do not believe violence to be a health issue. She replied that she starts off by listing the general causes of death, which alerts people that violence is high on that list. She then talks about health care expenditures and loss of life, and those point to the same issue. She also addresses how violence and exposure to violence affects health and discusses the definition of health as being not only the absence of disease or infirmity but the complete state of

physical, mental, and social well-being. Health is impossible when violence is present; therefore it is a health issue, Cosgrove added.

Joseph Richardson from the Capital Region Violence Intervention Program, an HVIP that has been running for more than 1 year and has served 116 participants, none of whom have returned to the emergency department, asked about the role that involvement with the criminal justice system plays as a risk factor for repeat violent injury and how to ameliorate the effects of incarceration on the risk of either engaging in or being a victim of violence. Bhatt replied that the criminal justice system has to be a critically important part of this discussion. He noted that the Data-Driven Justice Initiative, which includes 70 municipalities, has operationalized a data-sharing system that can provide data to drive particular interventions.

As a final comment, Hargarten clarified that the Dickey amendment prohibited CDC from using funds for advocacy purposes, not for firearm-related research. That was never prohibited, he said. However, the amendment did dampen funding streams by politicizing the issue. Congress can approve funds for research, but it has chosen not to, an important point from the perspective of CDC, which has funded firearm-related research to the extent that it can.

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Closing Remarks

In his closing comments at the end of the workshop, Jay Bhatt remarked that the workshop was historic in terms of discussing the interventions that health systems can implement to reduce firearm injury and death, stating the evidence supporting these interventions, and starting to develop a meaningful research agenda. For him, he said, the most important conversations were those about harmonizing data, systematizing wrap-around services, making trauma-informed care the norm, the development of needed workforce models, and the importance of integrating physical health, mental health, and behavioral health wrap around services. He thanked the participants for working together to break the cycle of violence.

Elizabeth McGlynn echoed Bhatt's comments and noted that there were many fundamental issues discussed in the workshop that must be addressed in order to improve the health and well-being of people throughout the nation. She added that while Kaiser Permanente is a big organization that can have an impact, it cannot solve this problem alone, and she said she looked forward to collaborating with the broad group of people who have been working on this issue for many years.

George Isham concluded the workshop by putting up a slide showing that firearm-related injuries are the third leading cause of pediatric deaths (see Figure 10-1). "It seems to me that I could do a lot with this information in front of a board of directors and people who care about priorities for developing health interventions for health systems," he said. Several years ago, he said, he used the same type of information showing that clinical care interventions only accounted for an estimated 20 percent of deaths in the United States to make an argument to the board of HealthPartners that

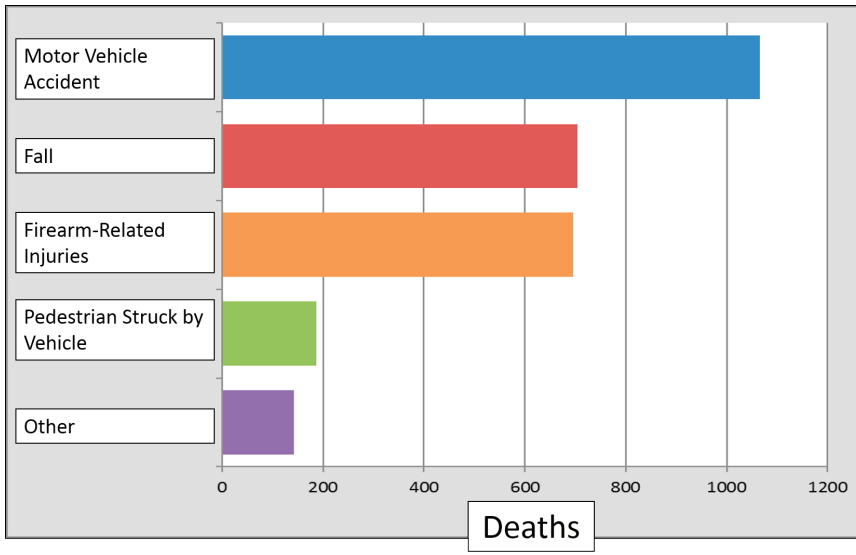

FIGURE 10-1 Leading causes of pediatric deaths in trauma centers in the United States (2010–2016).
SOURCES: Adapted from a presentation by Luke Neff at the workshop on Health Systems Interventions to Prevent Firearm Injuries and Death on October 17, 2018; ACS, 2019.

the health system should address the social, environmental, and behavioral determinants of health. The key here, he said, is that, as this workshop highlighted, there are effective interventions that health systems can implement to address firearm injury and death. As a final comment, Isham said that he was leaving the workshop optimistic that with the commitment of organizations such as the American Hospital Association, Kaiser Permanente, and others who participated in the 2 days of discussions that it will be possible to make persuasive arguments to health system leaders that their institutions can and should act.

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Appendix A

Workshop Agenda

WEDNESDAY, OCTOBER 17

8:00–9:00 AM **Registration and check-in** outside Fred Kavli Auditorium

9:00–9:15 AM **Opening remarks—Fred Kavli Auditorium**

Victor J. Dzau, M.D., President, National Academy of Medicine

9:15–9:30 AM **Workshop objectives**

Bechara Choucair, M.D., Senior Vice President and Chief Community Officer, Kaiser Permanente—National Community Health

Elizabeth A. McGlynn, Ph.D., Vice President, Kaiser Permanente Research; Executive Director, Center for Effectiveness and Safety Research

9:30–9:45 AM **Introduction to Day 1**

George J. Isham, M.D., M.S., Senior Fellow, HealthPartners Institute

9:45–10:15 AM **Presentation: Why do health systems have a role?**

Stephen Hargarten, M.D., M.P.H., Director, Comprehensive Injury Center; Professor, Emergency Medicine, Medical College of Wisconsin

10:15–11:45 AM **Session 1: What is the toll on individuals and communities?**

10:15–10:20 AM Introductions

Moderator: George J. Isham

10:20–10:40 AM **Presentation:** Case study: A victim and opportunities the health system had to intervene

Lucas P. Neff, M.D., Assistant Professor of Pediatric Surgery, Wake Forest University Baptist Medical Center

10:40–11:00 AM **Presentation:** The psychological and social burden of firearm violence on communities

Therese S. Richmond, Ph.D., CRNP, FAAN, Andrea B. Laporte Professor, Associate Dean for Research and Innovation, University of Pennsylvania School of Nursing; Penn Injury Science Center

11:00–11:45 AM Moderated Q&A

11:45 AM–12:45 PM **Break:** Complimentary lunch available in the Great Hall

12:45–2:15 PM **Session 2: Identifying individuals at higher risk for firearm violence**

12:45–1:45 PM Introductions

Moderator: Therese S. Richmond

Megan H. Bair-Merritt, M.D., MSCE, Executive Director, Center for the Urban Child and Healthy Family; Associate Professor of Pediatrics, Associate Division Chief, General Pediatrics, Boston Medical Center

Christopher Barsotti, M.D., CEO, AFFIRM Research; Chair, Trauma and Injury Prevention Section, American College of Emergency Physicians

David C. Grossman, M.D., M.P.H., Senior Associate Medical Director, Market Strategy and Public Policy; Senior Investigator, KPWA Health Research Institute, Kaiser Permanente

1:45–2:15 PM Moderated Q&A

2:15–3:30 PM **Session 3: Health systems interventions moving forward**

2:15–2:20 PM Introductions

Moderator: George J. Isham

2:20–2:40 PM **Presentation:** Developing a firearm storage decision aid to enhance lethal means counseling

Marian Betz, M.D., M.P.H., Associate Professor, Emergency Medicine, University of Colorado School of Medicine

2:40–3:00 PM **Presentation:** Creating consensus: The development of a firearm injury research agenda

Megan Ranney, M.D., M.P.H., FACEP, Associate Professor, Emergency Medicine, Brown University, AFFIRM Research

3:00–3:30 PM Moderated Q&A

3:30–4:45 PM **Session 4: Key issues from the day**

3:30–4:15 PM Moderator: Thea James, M.D., Associate Professor of Emergency Medicine, Associate Chief Medical Officer, Vice President of Mission for Boston Medical Center, and Director of the Violence Intervention Advocacy Program, Boston Medical Center

Patrick M. Carter, M.D., Assistant Director, Injury Prevention Center; Assistant Professor, Department of Emergency Medicine, University of Michigan School of Medicine

Joseph Simonetti, M.D., M.P.H., Clinician Investigator, and Assistant Professor, Rocky Mountain Mental Illness, Research, Education, and Clinical Center for Suicide Prevention, Veterans Health Administration

Daniel Webster, Sc.D., M.P.H., Bloomberg Professor of American Health in Violence Prevention, Director, Johns Hopkins Center for Gun Policy and Research, and Director, Johns Hopkins–Baltimore Collaborative for Violence Reduction, Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health

4:15–4:45 PM Moderated Q&A

4:45 PM **Adjourn**

THURSDAY, OCTOBER 18

8:00–9:00 AM **Registration and check-in** outside Fred Kavli Auditorium
Complimentary continental breakfast available in the Great Hall
NAS 250 available for speakers and planning committee

9:00–9:10 AM **Welcome and introduction to Day 2**

George J. Isham, M.D., M.S., Senior Fellow, HealthPartners Institute

9:10–11:45 AM **Session 5: Programs and research**

9:10–9:15 AM Introductions

Moderator: Joel Fein, M.D., M.P.H., Professor of Pediatrics and Emergency Medicine, University of Pennsylvania Perelman School of Medicine; Co-Director, Children's Hospital of Philadelphia

Violence Prevention Initiative; and Research Co-Director, National Network of Hospital-Based Violence Intervention Programs

9:15–9:35 AM **Presentation:** Project Ujima

Michael Levas, M.D., Assistant Professor, Medical College of Wisconsin

9:35–9:55 AM **Presentation:** Helping individuals with firearm injuries clinical trial

Ali Rowhani-Rahbar, M.D., M.P.H., Ph.D., Bartley Dobb Professor for the Study and Prevention of Violence, Associate Professor of Epidemiology, and Pediatrics, Violence Prevention Section Leader at Harborview Injury Prevention and Research Center, University of Washington

9:55–10:15 AM **Presentation:** SafERteens: An evidence-based youth violence prevention program and Firearm-Safety Among Children and Teens consortium (FACTS)

Rebecca Cunningham, M.D., Associate Vice President, Research, University of Michigan; Principal Investigator, Firearm-Safety Among Children and Teens Consortium (FACTS); Director, Centers for Disease Control and Prevention University of Michigan Injury Prevention Center; Professor of Emergency Medicine, University of Michigan School of Medicine; and Professor of Health Behavior and Health Education, University of Michigan School of Public Health

10:15–10:35 AM **Presentation:** Participatory approaches to implementing firearm safety promotion in pediatric primary care

Rinad Beidas, Ph.D., Assistant Professor, Department of Psychiatry and Department of Medical Ethics and Health Policy; and Director, Implementation Research, University of Pennsylvania Perelman School of Medicine

10:35–10:55 AM **Presentation:** State of the science for hospital-based violence intervention: Research and policy implications

Kyle Fischer, M.D., M.P.H., Adjunct Assistant Professor, and Health Policy and Leadership Fellowship Director, Department of Emergency Medicine, University of Maryland School of Medicine

10:55–11:45 AM Moderated Q&A

11:45 AM–12:45 PM **Break:** Complimentary lunch available in the Great Hall

NAS 250 available for speakers and planning committee

12:45–2:15 PM **Session 6: Developing networks and sharing information**

12:45–12:50 PM Introductions

Moderator: George J. Isham

12:50–1:10 PM **Presentation:** Building a learning health care system for suicide prevention

Gregory E. Simon, M.D., M.P.H., Senior Investigator, Kaiser Permanente Washington Health Research Institute; Principal Investigator, Mental Health Research Network, Kaiser Permanente

1:10–1:30 PM **Presentation:** The importance of networking/sharing information/best practices between systems

Linnea Ashley, M.P.H., Training and Advocacy Director, Youth ALIVE!; Managing Director, National Network of Hospital-Based Violence Intervention Programs

1:30–2:15 PM Moderated Q&A

2:15–4:00 PM **Session 7: Developing a culture of health care providers as intervenors**

2:15–3:15 PM Moderator: Stephen Hargarten, M.D., M.P.H., Director, Comprehensive Injury Center; Professor, Emergency Medicine, Medical College of Wisconsin

Jay Bhatt, D.O., M.P.H., M.P.A., Senior Vice President and Chief Medical Officer, American Hospital Association

Shannon Cosgrove, M.H.A., Director of Health Policy, Cure Violence

Deborah A. Kuhls, M.D., FACS, FCCM, Professor of Surgery, University of Nevada, Las Vegas, School of Medicine; Chair, American College of Surgeons Committee on Trauma Injury Prevention and Control Committee

3:15–4:00 PM Moderated Q&A

4:00 PM **Closing remarks and reflection on key issues**
George J. Isham

4:15 PM **Adjourn**

Appendix B

Speaker Biographical Sketches

Linnea Ashley, M.P.H., wears many hats at Youth ALIVE! She was pivotal in the recent passage of a California State bill that recognizes the value of peer counseling for victims of violence. AB 1629, which is now the law, makes financial reimbursement available for peer counseling services. Ms. Ashley works on legislative initiatives, does research, and provides training and staff support. As the managing director of the National Network of Hospital-Based Violence Intervention Programs, she coordinates a partnership among 30 domestic and 3 international organizations. Ms. Ashley is a food and travel buff and former Peace Corps member with a background in international health development. She holds a B.A. in journalism from Florida A&M and an M.P.H. from Tulane University, where she was a Rotary Ambassadorial Scholar.

Megan H. Bair-Merritt, M.D., MSCE, is an associate professor of pediatrics and the associate division chief of academic general pediatrics at Boston Medical Center. Dr. Bair-Merritt is a general pediatrician and child health services researcher. She completed her pediatrics residency and academic fellowship at the Children's Hospital of Philadelphia. Her research has focused on screening for and responding to intimate partner violence in the health setting, the impact of family violence on child health, and interventions to partner with families to promote resilience and child well-being. She has conducted social epidemiology and intervention research for more than 10 years. To date, Dr. Bair-Merritt has published 69 scientific and invited articles, 11 letters and editorials, and 10 book chapters that pre-

dominantly focus on family violence and child health. She has continuously funded her work through federal and foundation grants.

Christopher Barsotti, M.D., FACEP, is a community practice emergency physician in western Massachusetts and southern Vermont who recognizes the potential for physicians to leverage science and their professional accountability in the interest of public health and safety. In response to the profound and longstanding deficiency in federal funding for public health research on gun violence, he co-founded and is current chief executive officer of the American Foundation for Firearm Injury Reduction in Medicine (AFFIRM), a novel physician-led 501(c)(3) public charity that funds firearm injury prevention research through private sector financial partnerships.

Dr. Barsotti currently serves as the chair of the Trauma and Injury Prevention Section of the American College of Emergency Physicians (ACEP) and participates in the Committee on Preparedness and Violence Intervention and the Committee on Prevention of the Massachusetts Medical Society. He participated in the ACEP Technical Advisory Group for Firearm Research and co-authored the group's consensus driven agenda for firearm injury prevention research published in the *Annals of Emergency Medicine* in February 2017.

Rinad Beidas, Ph.D., is an assistant professor of psychology in psychiatry at the Perelman School of Medicine, University of Pennsylvania; the director of implementation research at the Center for Mental Health Policy and Services Research; and the director of the Implementation Science Working Group at the University of Pennsylvania. Dr. Beidas's research group has two primary foci: improving behavioral health and the quality of behavioral health services for traditionally underserved patients, and advancing the study of methods to promote the systematic uptake of research findings and other evidence-based practices (EBPs) into routine practice to improve the quality and effectiveness of health services (i.e., implementation science). Dr. Beidas is an established expert in implementation science; a recent social network analysis conducted by Norton and colleagues identified her as among the top 10 implementation science experts nationally. Dr. Beidas has published approximately 100 articles and is the co-editor of the only book published on EBPs in youth, *Dissemination and Implementation of Evidence-Based Practices in Child and Adolescent Mental Health*. Dr. Beidas's work has been funded by the National Institutes of Health continuously since 2012. Dr. Beidas is deeply committed to partnering with community stakeholders to understand the best way to implement evidence-based practices and improve behavioral health and health services across a variety of settings, including community mental health, pediatric primary care, and schools. Furthermore, Dr. Beidas and her group are vested in

building capacity in implementation science and growing the next generation of implementation science investigators.

Dr. Beidas holds a B.A. in psychology from Colgate University and a doctorate of philosophy in psychology from Temple University. She is a licensed clinical psychologist in Pennsylvania. Dr. Beidas is a senior fellow in the Leonard Davis Institute and directs the Leonard Davis Institute's Implementation Science Working Group. She is also an alumna fellow of the National Institutes of Health–funded Training Institute in Dissemination and Implementation Research in Health, Implementation Research Institute, and the Child Intervention and Prevention Services Fellowship. She is the recipient of a number of awards, including the Association for Behavioral and Cognitive Therapies president's New Researcher Award in 2015; the American Psychological Foundation Diane J. Willis Early Career Award; and the University of Pennsylvania Perelman School of Medicine's Marjorie Bowman New Investigator Research Award in 2017.

Marian (Emmy) Betz, M.D., M.P.H., is an emergency physician who works clinically at the University of Colorado Hospital emergency department (ED) and conducts research in injury epidemiology and prevention. She is currently an associate professor of emergency medicine at the University of Colorado School of Medicine, and she received her M.D. and M.P.H. from Johns Hopkins University. Dr. Betz's areas of research expertise are "lethal means safety" (i.e., limiting access to guns and other lethal methods for those who are suicidal) and the care of suicidal patients in EDs. She has worked with numerous organizations on issues of suicide prevention, including the Colorado Suicide Prevention Commission, the Suicide Prevention Resource Center, and the American Foundation for Suicide Prevention. She co-founded and leads the Colorado Firearm Safety Coalition, a collaborative effort between public health and medical professionals and firearm retailers to reduce firearm suicides. Her research has received funding from the National Institutes of Health and numerous foundations. Her prior work has included publications and presentations related to ED provider attitudes toward lethal means restriction for suicide prevention, suicidality among older adults, public opinion about firearm safety discussions, and strategies for enhancing provider–patient communication about sensitive topics, and in 2015 she gave a TEDxMileHigh talk on firearm suicide. Dr. Betz also conducts research related to geriatric injury prevention and is a current recipient of supplemental funding from the National Institute on Aging for work related to firearm access among individuals with Alzheimer's disease and other forms of dementia.

Jay Bhatt, D.O., M.P.H., M.A., FACP, serves as the chief medical officer of the American Hospital Association and the president of the Health Re-

search and Educational Trust. Most recently, he was the first chief health officer at the Illinois Health and Hospital Association. In this role he led large improvement projects including the Hospital Engagement Network, which is aimed at reducing readmissions and hospital-acquired conditions. He has launched several improvement collaboratives, managed the Medical Executive Forum, led the Midwest Alliance for Patient Safety, launched a physician leadership academy, and designed and advanced a statewide high-reliability initiative.

Previously, he was the managing deputy commissioner and chief innovation officer for the Chicago Department of Public Health (CDPH). There he led the implementation of Healthy Chicago, the city's public health agenda, as well as innovations in cross-sector partnerships, predictive analytics, epidemiology, and informatics. He led the department to be internationally and nationally recognized in its approach to using predictive analytics to improve food inspections and chronic disease, West Nile, and lead inspections. He also led a groundbreaking initiative with Advocate South Asian Cardiovascular Center in developing the South Asian Healthy Eating Benefits program along with a partnership to reimagine community benefit spending with Presence Health. Under his leadership, the CDPH was awarded Local Health Department of the Year and received an award from the National Forum for Heart Disease and Stroke Prevention.

He also is a practicing internal medicine physician for Erie Family Health Center in Chicago serving vulnerable populations and is a member of both the Feinberg School of Medicine at Northwestern faculty and the University of Michigan Medical School faculty. He graduated from the University of Chicago in 1999 with a degree in economics. In 2008, Dr. Bhatt received both his M.D. from the Philadelphia College of Osteopathic Medicine and his M.P.H. from the University of Illinois at Chicago School of Public Health. In 2012, he received his M.P.A. from the Harvard Kennedy School of Government as a Zuckerman Leadership Fellow and Mongan Commonwealth Fund/Harvard Minority Health Policy Fellow. He was a White House Fellows National Finalist in 2013. He is an American College of Physicians Walter McDonald Young Physician Awardee, received 40 under 40 health innovator award recognition, and was selected to the prestigious Presidential Leadership Scholars Program in 2016.

Patrick M. Carter, M.D., is an assistant professor of emergency medicine at the University of Michigan (UM) School of Medicine and the assistant director of the Centers for Disease Control and Prevention–funded UM Injury Prevention Center. He completed his clinical training and chief residency in emergency medicine at the University of Michigan, followed by a 2-year research fellowship sponsored by a National Institutes of Health T32 grant through the UM Addiction Research Center and the Injury Pre-

vention Center. His current research focuses on firearm injury prevention, specifically the development and implementation of emergency department (ED)-based interventions to decrease firearm violence and associated risk behaviors, such as substance use among high-risk urban youth populations. He has led several projects examining the public health problem of firearm violence, including studies characterizing illegal firearm possession among youth, firearm violence outcomes among ED populations, and the unique characteristics of firearm conflicts that differentiate them from other types of peer violence. He has also directed or is actively directing projects examining behavioral interventions for decreasing or preventing violence among urban youth populations. Dr. Carter has served as a member of the technical advisory group focused on developing a firearm research agenda for the American College of Emergency Physicians. His work has also focused on examining policy-level interventions across several injury-related public health issues, including firearm violence and alcohol-impaired driving. Dr. Carter currently has funding as a principal investigator or co-investigator on grants from the Centers for Disease Control and Prevention, the National Institute on Drug Abuse, the National Institute on Alcohol Abuse and Alcoholism, and the National Institute of Child Health and Human Development, all of which are focused within the field of violence and injury prevention.

Bechara Choucair, M.D., is the senior vice president and the chief community health officer at Kaiser Permanente. He oversees the organization's national community health efforts and philanthropic giving activities aimed at improving the health of its 12.2 million members and the 68 million people who live in the communities it serves. Prior to joining Kaiser Permanente, Dr. Choucair was the commissioner of the Chicago Department of Public Health for 5 years before serving as a senior vice president at Safety Net Transformation and Community Health at Trinity Health. In 2018, Dr. Choucair was named #10 on *Modern Healthcare*'s list of the 50 Most Influential Health Executives in the United States.

Shannon Cosgrove, M.H.A., serves as the director of health policy at Cure Violence, where she is responsible for staffing the Movement towards Violence as a Health Issue, which is chaired by David Satcher, a former U.S. Surgeon General; Alfred Sommer, a former dean of the Johns Hopkins Bloomberg School of Public Health; and Gary Slutkin, the founder and the chief executive officer of Cure Violence. In this role she oversees public education and developing and implementing a heath approach framework, and she identifies policies to promote and sustain the work with an equity lens.

Previously, Ms. Cosgrove served as the deputy director for the Mayor's Office on Criminal Justice in Baltimore City. Her past roles include health

equity manager on the Healthier Communities Team at YMCA of the United States, a project officer at the Centers for Disease Control and Prevention's (CDC's) racial and ethnic approaches to community health team, and the health disparities coordinator at the Baltimore City Health Department through CDC's Public Health Prevention Fellowship Program, where she also served as the chair of the Health Equity and Social Justice Committee.

While receiving her M.H.A. and B.Sc. in health policy and administration from The Pennsylvania State University, Ms. Cosgrove served as a peer behavioral interventionist and as the grant coordinator at Centre Volunteers in Medicine.

Rebecca Cunningham, M.D., is the director of the Centers for Disease Prevention and Control–funded University of Michigan (UM) Injury Prevention Center, the associate vice president for health sciences research for the UM Office of Research, a professor in the UM Department of Emergency Medicine, and a professor of health behavior and health education at the UM School of Public Health.

Dr. Cunningham has had a distinguished career in researching injury prevention, particularly of youth and young adult populations. Her focus on brief interventions in the emergency room has included using technology to overcome barriers to reaching youth to prevent substance use and violent injury (SafERTeens intervention/National Institute on Alcohol Abuse and Alcoholism) and longitudinal studies of youth seeking emergency department care with assault injury, including firearm injury (National Institute on Drug Abuse). She is the principal investigator of the 2017 National Institute of Child Health and Human Development–funded Firearm Safety Among Children and Teens Consortium. This grant brings together firearm researchers across the country to build capacity in this field by their collective work to generate of a research agenda for firearm injury among children; conduct innovative firearm prevention science; create a data repository to enhance analysis and access to firearm data; and train postdoctoral fellows in the science of firearm injury prevention.

Joel A. Fein, M.D., M.P.H., is a professor of pediatrics and emergency medicine at the Perelman School of Medicine at the University of Pennsylvania and an attending physician in the emergency department at the Children's Hospital of Philadelphia (CHOP). He is a co-director of the CHOP Violence Prevention Initiative at the Center for Injury Research and Prevention. Dr. Fein is the research co-director of the National Network of Hospital-Based Violence Intervention Programs (NNHVIP) and a member of the leadership team for the Center for Pediatric Traumatic Stress, an intervention development center within the National Child Traumatic Stress

Network. Dr. Fein is a co-chair of the Philadelphia Adverse Childhood Experiences (ACES) Task Force, a coalition of regional stakeholders who introduce ACES knowledge into programs, curricula, and research. At CHOP he is the medical advisor to the Community Relations Department and the director of advocacy and health policy for the emergency department.

Dr. Fein completed his B.A. in biology and psychology at Wesleyan University in Middletown, Connecticut; his M.D. at the New York University School of Medicine; and his M.P.H. at the University of Pennsylvania. He completed his residency in pediatrics fellowship in pediatric emergency medicine at CHOP and is board certified in pediatrics and pediatric emergency medicine. Dr. Fein has received funding from the National Institutes of Health, the Centers for Disease Control and Prevention, and the Department of Health and Human Services to support his research and has published more than 70 peer-reviewed research papers on topics including violence prevention, pain management, and mental health in the emergency setting.

Kyle Fischer, M.D., M.P.H., is an adjunct assistant professor and the director of the Health Policy and Leadership Fellowship program at the University of Maryland School of Medicine's Department of Emergency Medicine. Broadly, his interests focus on novel approaches to emergency department–based public health interventions and their intersection with public policy. Dr. Fischer has done extensive work in the field of violence prevention through the National Network of Hospital-Based Violence Intervention Programs, where he serves as the policy director and a member of the steering committee.

Dr. Fischer's health policy work is grounded in considerable experience in legislative health policy. He has previously held positions in the Wisconsin and Maryland state legislatures as well as the U.S. House of Representatives Energy and Commerce Committee–Subcommittee on Health.

Dr. Fischer received a B.S. from the University of Wisconsin. He continued at the University of Wisconsin School of Medicine and Public Health to receive a combined M.D./M.P.H. He completed his emergency medicine residency at Drexel University in Philadelphia, where he was also chief resident. Subsequently, he completed a fellowship in health policy and leadership at the University of Maryland School of Medicine.

David Grossman, M.D., M.P.H., is a senior investigator, a pediatrician at Kaiser Permanente Washington, and a senior medical director for the Washington Permanente Medical Group. Dr. Grossman's research includes evaluating interventions to improve the uptake of preventive services. He has an extensive background in injury prevention and control as well as in

Native American health disparities research. He is immediate past chair of the U.S. Preventive Services Task Force (USPSTF). Dr. Grossman served as a member of the USPSTF from 2008 until March 2018.

In his role as a senior associate medical director for Washington Permanente Medical Group, Dr. Grossman assists customers with population strategy for some of the organization's largest purchasers. He also collaborates with teams in Kaiser Permanente Washington's public policy and community benefit programs to help improve the health and well-being of members and the community. A graduate of University of California, Berkeley, and the University of California, Los Angeles, School of Medicine, Dr. Grossman did his pediatric residency at the University of North Carolina. From 1988 to 1990, he was a Robert Wood Johnson Foundation Clinical Scholar at the University of Washington, where he is currently a professor of health services and adjunct professor of pediatrics.

Stephen Hargarten, M.D., M.P.H., received his M.D. from the Medical College of Wisconsin in 1975 and his M.P.H. from Johns Hopkins University in 1984. He is a professor and the chair of the Department of Emergency Medicine, the associate dean for global health, and the director of the Comprehensive Injury Center at the Medical College of Wisconsin. Dr. Hargarten's research interests reflect an intersection of injury and violence prevention and health policy to address the burden of this biopsychosocial disease. His work in linking data systems for understanding violent deaths informed the development of the Center for Disease Control and Prevention's (CDC's) National Violent Death Reporting System. Dr. Hargarten serves on the national boards of Advocates for Highway and Auto Safety and the Association for Safe International Road Travel. He was inducted into the Johns Hopkins Society of Scholars and elected to the National Academy of Medicine in 2011. In 2014, Dr. Hargarten began serving as president of the Milwaukee Global Health Consortium (formerly the Center for International Health), a consortium of nine member academic, health care, and governmental organizations and agencies dedicated to addressing local and global health issues, including patient care, education and training, research, and community engagement. He was the founding president of the Society for the Advancement of Violence and Injury Research and has served on the Violence and Injury Prevention Mentoring Committee for the World Health Organization. Most recently, Dr. Hargarten was appointed to the executive committee of the National Academies of Sciences, Engineering, and Medicine's Transportation Research Board and to the CDC Community Preventive Services Task Force, each for a 3-year term.

George J. Isham, M.D., is currently a senior fellow at the HealthPartners Institute in Minneapolis, Minnesota. His areas of interest include under-

standing how health is created in populations and how to improve health and health care quality and financing. Dr. Isham is also currently a senior advisor to the Alliance of Community Health Plans, a national leadership organization bringing together innovative health plans and provider groups that are among America's best at delivering affordable, high-quality coverage and care. He is an elected member of the National Academy of Medicine; has chaired the National Academies of Sciences, Engineering, and Medicine's Roundtable on Population Health Improvement and the Roundtable on Health Literacy; and has chaired, served, and been a reviewer for consensus study reports and participated in a number of workshops.

Dr. Isham has been active in health policy, serving as a former member of the Center for Disease Control and Prevention's Task Force on Community Preventive Services and of the Agency for Healthcare Research and Quality's U.S. Preventive Services Task Force, as a founding co-chair of National Committee for Quality Assurance's committee on performance measurement, and as a founding co-chair of the National Quality Forum's Measurement Application Partnership.

Dr. Isham earned his B.A. in zoology and M.S. in preventive medicine/administrative medicine from the University of Wisconsin–Madison and his M.D. from the University of Illinois in Chicago. He completed his internship and residency in internal medicine at the University of Wisconsin Hospital and Clinics in Madison, Wisconsin.

Thea L. James, M.D., is an associate professor of emergency medicine at the Boston Medical Center/Boston University School of Medicine. She also serves as the associate chief medical officer, vice president of mission, and director of the Violence Intervention Advocacy Program at the Boston Medical Center.

Dr. James has chaired and served on national committees within the Society for Academic Emergency Medicine (SAEM), served as a moderator, and given public lectures and talks. She was appointed to the SAEM Women in Academic Emergency Medicine Task Force, is a member of the Boston University School of Medicine admissions committee, and, in 2009, was appointed to the Massachusetts Board of Registration in Medicine, where she presently serves as chair of the licensing committee. Dr. James is the 2008 awardee of the David H. Mulligan Award for public service.

Dr. James's passion is in public health both domestically and globally. She is a supervising medical officer on the Boston Disaster Medical Assistance Team, under the Department of Health and Human Services, which has responded to several disasters in the United States and across the globe. She has deployed to post-9/11 in New York City; Hurricane Katrina in New Orleans in 2005; Bam, Iran, after the earthquake in 2003; and Port-Au-Prince, Haiti, after the earthquake in 2010.

For 12 years Dr. James has traveled to Haiti with colleagues and emergency medicine residents. A graduate of the Georgetown University School of Medicine, she completed an emergency medicine residency at Boston City Hospital, where she was a chief resident.

Deborah A. Kuhls, M.D., FACS, FCCM, is a professor of surgery, trauma, and critical care. Dr. Kuhls is a trauma surgeon and is board certified in general surgery and critical care. She also is the program director of University of Nevada, Las Vegas, School of Medicine's Surgical Critical Care Fellowship Program and the medical director of the University Medical Center's trauma intensive care unit. She has a passion for teaching medical students, residents and fellows. Dr. Kuhls graduated from the Medical College of Pennsylvania (now Drexel University School of Medicine) and completed a general surgery residency at Albert Einstein University and a fellowship in critical care and trauma at the R. Adams Cowley Shock Trauma Center at the University of Maryland. She subsequently completed Drexel University's Executive Leadership in Academic Medicine fellowship. Dr. Kuhls's research interests include injury prevention of all types, including vehicular crash, firearm, and other violence-related injuries, as well as disaster management, medical education, and the clinical care and outcomes of injured patients. Dr. Kuhls is active in many professional organizations and is the president of the Nevada chapter of the American College of Surgeons, chair of the American College of Surgeons Committee on Trauma Injury Prevention and Control Committee, and treasurer of the Clark County Medical Society. She also serves on the advocacy and governmental affairs committees of multiple organizations.

Michael N. Levas, M.D., M.S., is an associate professor of pediatrics in the Section of Emergency Medicine at the Medical College of Wisconsin. Dr. Levas has been with the Medical College of Wisconsin's Section of Pediatric Emergency Medicine since 2011. He is a local product from the south side of Milwaukee and completed his undergraduate work at Saint Norbert College in De Pere, Wisconsin. Following graduation from the Medical College of Wisconsin, he completed his residency and fellowship training in Kansas City, Missouri. Since joining the faculty at the Medical College, Dr. Levas has been intimately involved with youth violence and injury prevention policy and research. He is the assistant medical director of Project Ujima, the premier hospital-based youth violence prevention and intervention program in the United States.

Elizabeth A. McGlynn, Ph.D., is the vice president of Kaiser Permanente Research and the executive director of the Kaiser Permanente Center for Effectiveness and Safety Research. She is the senior national executive

leader for research in Kaiser Permanente and is responsible for coordinating the development and implementation of the national research strategy, working with national and regional leadership to enhance the contribution of research to improved care for Kaiser Permanente members and the communities in which they live. She is also responsible for the oversight of research administration, the ongoing development and use of the Kaiser Permanente Research Bank, and two internal research and analytic groups.

Dr. McGlynn is an internationally known expert on methods for evaluating the appropriateness and quality of health care delivery. Prior to joining Kaiser Permanente, Dr. McGlynn was the associate director of RAND Health and held the RAND Distinguished Chair in Health Care Quality. She received AcademyHealth's Distinguished Investigator Award in 2012. Dr. McGlynn is a member of the National Academy of Medicine. She is the immediate past chair of the American Board of Internal Medicine Foundation board of trustees. She is the former chair of the National Advisory Council for the Agency for Healthcare Research and Quality and serves on the Institute for Healthcare Improvement's scientific advisory group and the National Evaluation System for Health Technology's governing committee. She is on the editorial boards of *JAMA*, *Health Services Research*, and *The Milbank Quarterly*.

Lucas P. Neff, M.D., is an assistant professor of pediatric surgery at Wake Forest University. He is a veteran of the U.S. Air Force and served in Afghanistan as a combat surgeon in support of Operation Enduring Freedom. He has an extensive background in developing translational science models to study the physiology of shock resuscitation. In addition, he has focused his efforts in elucidating the causes of health disparities as they relate to common pediatric surgical conditions.

For Dr. Neff, the issue of pediatric firearm injury has become very personal. While he was deeply affected by the many injured Afghan children that he cared for, he was not prepared for the magnitude of pediatric firearm injury that he encountered upon returning to the United States and starting his pediatric surgical fellowship. This has launched a new area of academic and clinical interest for him, and he is excited to connect with like-minded individuals and increase the population health dialogue among all stakeholders—especially gun rights advocates.

Megan Ranney, M.D., M.P.H., FACEP, is an associate professor in the Department of Emergency Medicine at the Alpert Medical School of Brown University; the director and founder of the Brown Emergency Digital Health Innovation program; and the chief research officer for the American Foundation for Firearm Injury Reduction in Medicine Research, a philanthropy focused on filling the funding gap for firearm injury prevention research.

She also serves as the chair of the state's Governor's Task Force on Gun Safety. Dr. Ranney's career focus is on developing, testing, and disseminating technology-based interventions to prevent violence and mental illness. She is currently the principal investigator or co-investigator on seven federally funded grants and has more than 95 peer-reviewed publications. She currently serves as an elected member-at-large on the board of directors for the Society for Academic Emergency Medicine; serves an editor for *Annals of Emergency Medicine*; and chairs regional and national committees on firearm injury within and outside of emergency medicine. She has received numerous awards for technology innovation, public health, and research. Dr. Ranney graduated from Harvard University with a B.A. (summa cum laude) in the history of science. She served as a Peace Corps volunteer in Cote d'Ivoire prior to attending medical school at Columbia University College of Physicians and Surgeons in New York City. She graduated with Alpha Omega Alpha status and received the Leonard Tow Humanism in Medicine award on graduation. She completed an internship, residency, and chief residency in emergency medicine as well as a fellowship in injury prevention research and an M.P.H. at Brown University.

Therese S. Richmond, Ph.D., CRNP, FAAN, is passionate about using nursing science to prevent injury and violence and improve outcomes, particularly in patients from vulnerable urban populations worldwide—those who live on the margins of society, have limited resources, or live in pervasively violent communities. An early clinical position in a Washington, DC, trauma intensive care unit and resuscitation unit sparked Dr. Richmond's interest in preventing injuries and her curiosity about survivors' quality of life. This experience led to a specialization in nursing care for victims of injury and violence, including co-founding the Firearm and Injury Center at Penn two decades ago, which has since become a vibrant interdisciplinary research center: the Penn Injury Science Center.

In her role as the associate dean for research and innovation, Dr. Richmond helps shape the research-and-innovation-focused environment that is Penn Nursing. She facilitates systems to enhance research, scholarship, and innovation productivity. She led efforts to create a strategic vision for innovation at Penn Nursing—infusing new courses in the curriculum, developing a Penn Nursing Faculty Fellow in Innovation, and facilitating efforts to create new solutions to solve important problems.

Dr. Richmond also helps shape systems to help faculty increase their scholarship and productivity. Along with geographers, criminologists, attorneys, nurses, psychologists and other experts, Dr. Richmond's research involves all levels of students, including undergraduate research assistants who work with her research staff and doctoral and postdoctoral members of her research teams. She has received many awards for teaching and men-

toring at Penn, including the Lindback Award for Distinguished Teaching. Dr. Richmond teaches and mentors undergraduates and doctoral students.

Ali Rowhani-Rahbar, Ph.D., M.D., M.P.H., is the Bartley Dobb Professor for the Study and Prevention of Violence at the University of Washington. He is the violence prevention section leader at the Harborview Injury Prevention and Research Center. His epidemiologic studies have spanned multiple forms of violence, including firearm violence, youth violence, bullying, child maltreatment, intimate partner violence, and suicide. Dr. Rowhani-Rahbar investigates violent victimization and perpetration with an integrated public health and public safety approach. His research on interpersonal violence is specifically focused on the nexus of trauma and crime to inform interventions that prevent violence from occurring in the first place, promote healing following violence, and reduce recidivism. His research on self-directed violence is specifically focused on means safety. Dr. Rowhani-Rahbar has served on the American College of Emergency Physicians Technical Advisory Group on Firearm Violence Research, the Firearms Subcommittee of Washington State Safer Homes Task Force for Suicide Prevention, and the editorial board of the journal *Injury Prevention*. He has also served as an elected member of the board of directors of the Society for Advancement of Violence and Injury Research.

Gregory Simon, M.D., M.P.H., is an investigator at the Kaiser Permanente Washington Health Research Institute and a psychiatrist in Kaiser Permanente's Behavioral Health Service. He is also a research professor in the Department of Psychiatry and Behavioral Sciences at the University of Washington and co-chair of the national scientific advisory board of the Depression and Bipolar Support Alliance. Dr. Simon completed residency training in internal medicine at the University of Washington, residency training in psychiatry at the Massachusetts General Hospital, and fellowship training in the Robert Wood Johnson Clinical Scholars program at the University of Washington. Dr. Simon's research focuses on improving access to and the quality of mental health care, especially for mood disorders. Specific areas of research include improving adherence to medication, increasing the availability of effective psychotherapy, evaluating peer support by and for people with mood disorders, identifying and reducing the risk of suicidal behavior, the cost-effectiveness of treatment, and the comorbidity of mood disorders with chronic medical conditions. Dr. Simon currently leads the Mental Health Research Network, a National Institute of Mental Health–funded cooperative agreement supporting population-based mental health research across 13 large health systems.

Joseph Simonetti, M.D., M.P.H., earned his M.D. from The Ohio State University in 2008 and completed his training in internal medicine at the University of Pittsburgh prior to serving as chief medical resident from 2011 to 2012. He then moved to Seattle where he completed a National Institutes of Health National Research Service Award fellowship, worked as a senior research fellow in the Harborview Injury Prevention and Research Center at the University of Washington and the Department of Veterans Affairs' (VA's) Patient Aligned Care Team National Demonstration Lab, and earned his M.P.H. from the University of Washington.

Currently he is an internal medicine physician practicing within the VA Eastern Colorado Healthcare System. He has research appointments within the VA Rocky Mountain Mental Illness Research, Education, and Clinical Center for Suicide Prevention and the Denver–Seattle Center for Veteran-Centered and Value-Driven Care.

Dr. Simonetti's research focuses on reducing the burden of intentional and unintentional firearm injuries nationally. He joined the VA to adapt his expertise in firearm injury prevention to system-level strategies that can be used to mitigate the high burden of suicide, particularly firearm-related suicide, among U.S. veterans. His current focus is on developing veteran-centered approaches to facilitating lethal means safety as a suicide prevention strategy.

Daniel Webster, Sc.D., M.P.H., is the inaugural Bloomberg Professor of American Health at the Johns Hopkins Bloomberg School of Public Health where he directs the Center for Gun Policy and Research and serves as the co-lead of the Violence Prevention Workgroup of the Bloomberg American Health Initiative. Dr. Webster is one of the nation's leading experts on the prevention of gun violence and has published more than 120 articles in scientific journals on topics including gun policy, violence prevention, youth violence, intimate partner violence, suicide, and substance abuse. He is the lead editor and a contributor to *Reducing Gun Violence in America: Informing Policy with Evidence and Analysis* (Johns Hopkins University Press, 2013).

Dr. Webster's research has informed policies to reduce gun violence at the local, state, and federal level. He led Baltimore's Homicide Review Commission and now leads the Johns Hopkins–Baltimore Collaborative for Violence Reduction. His awards include the American Public Health Association's David Rall Award for science-based advocacy (2015), Baltimore City's Health Equity Leadership Award (2016), the Pioneer Award from the Injury Free Coalition for Kids (2017), and the Johns Hopkins University Distinguished Alumni Award (2017).