SEPTEMBER 2015 | VOLUME 100 NUMBER 1S | AMERICAN COLLEGE OF SURGEONS

Bulletin

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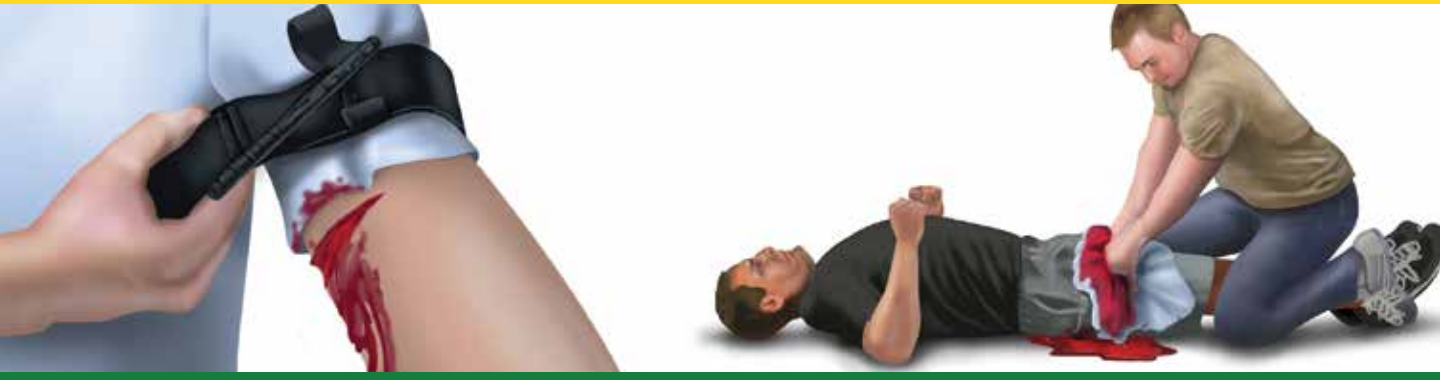

Improving Survival

Strategies to Enhance Survival in Active Shooter and Intentional Mass Casualty Events: A Compendium

HARTFORD CONSENSUS
THREAT
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IMPROVING SURVIVAL

Contents

CONTRIBUTIONS

Increasing survival, enhancing citizen resilience 8
David B. Hoyt, MD, FACS

Letter from the Vice-President 9
Joseph R. Biden, Jr., Vice-President of the United States

Presidential Policy Directive: National preparedness 10
Barack H. Obama, President of the United States

A systematic response to mass trauma: The public, organized first responders, and the American College of Surgeons 14
Andrew L. Warshaw, MD, FACS, FRCSEd(Hon)

Strategies to enhance survival in active shooter and intentional mass casualty events 16
Lenworth M. Jacobs, Jr., MD, MPH, FACS

Roundtable meetings 18

The military experience and integration with the civilian sector 22
Jonathan Woodson, MD, FACS

The Department of Homeland Security's role in enhancing and implementing the response to active shooter and intentional mass casualty events 24
Kathryn H. Brinsfield, MD, MPH, FACEP; and Ernest (Ernie) Mitchell, Jr., MPA

Bulletin reprint: Initial management of mass-casualty incidents due to firearms: Improving survival 28
Lenworth M. Jacobs, Jr., MD, MPH, FACS; Karyl J. Burns, RN, PhD; Norman McSwain, MD, FACS; and Wayne Carver, MD

continued on next page

Contents *continued*

CONTRIBUTIONS (CONTINUED)

Bulletin reprint: Improving Survival from Active Shooter Events: The Hartford Consensus 32
Joint Committee to Create a National Policy to Enhance Survivability from Mass Casualty Shooting Events

Bulletin reprint: Active Shooter and Intentional Mass-Casualty Events: The Hartford Consensus Statement II 35
Joint Committee to Create a National Policy to Enhance Survivability from Mass Casualty Shooting Events

Bulletin reprint: The Hartford Consensus III: Implementation of Bleeding Control 40
Lenworth M. Jacobs, Jr., MD, MPH, FACS, and the Joint Committee to Create a National Policy to Enhance Survivability from Intentional Mass-Casualty and Active Shooter Events

The continuing threat of intentional mass casualty events in the U.S.: Observations of federal law enforcement 47
William P. Fabbri, MD, FACEP

Public health education: The use of unique strategies to educate the public in the principles of the Hartford Consensus 53
Richard H. Carmona, MD, MPH, FACS

The continuing threat of active shooter and intentional mass casualty events: Local law enforcement and hemorrhage control 56
Alexander L. Eastman, MD, MPH, FACS

Military history of increasing survival: The U.S. military experience with tourniquets and hemostatic dressings in the Afghanistan and Iraq conflicts 60
Frank K. Butler, MD, FAAO, FUHM

continued on next page

Contents *continued*

CONTRIBUTIONS (CONTINUED)

Hemorrhage control devices: Tourniquets and hemostatic dressings 66
John B. Holcomb, MD, FACS; Frank K. Butler, MD, FAAO, FUHM; and Peter Rhee, MD, MPH, FACS

Intentional mass casualty events: Implications for prehospital emergency medical services systems 72
Matthew J. Levy, DO, MSc, FACEP

Role of the American College of Surgeons Committee on Trauma in the care of the injured 75
Leonard J. Weireter, MD, FACS; and Ronald M. Stewart, MD, FACS

Integrated education of all responders 78
Norman E. McSwain, MD, FACS

Implementation of the Hartford Consensus initiative to increase survival from active shooter and intentional mass casualty events and to enhance the resilience of citizens 83
Lenworth M. Jacobs, Jr., MD, MPH, FACS

Summary 88
Lenworth M. Jacobs, Jr., MD, MPH, FACS

The American College of Surgeons is dedicated to improving the care of the surgical patient and to safeguarding standards of care in an optimal and ethical practice environment.

EDITOR-IN-CHIEF
Diane Schneidman

DIRECTOR, DIVISION OF INTEGRATED COMMUNICATIONS
Lynn Kahn

SENIOR EDITOR
Tony Peregrin

EDITORIAL & PRODUCTION ASSISTANT
Matthew Fox

CONTRIBUTING EDITOR
Jeannie Glickson

SENIOR GRAPHIC DESIGNER/ PRODUCTION MANAGER
Tina Woelke

GUEST EDITORS
Lenworth M. Jacobs, Jr., MD, MPH, FACS
Karyl J. Burns, RN, PhD

FRONT COVER/ARTICLE DESIGN
Mary Beth Cohen

Letters to the Editor should be sent with the writer's name, address, e-mail address, and daytime telephone number via e-mail to dschneidman@facs.org, or via mail to Diane S. Schneidman, Editor-in-Chief, *Bulletin,* American College of Surgeons, 633 N. Saint Clair St., Chicago, IL 60611. Letters may be edited for length or clarity. Permission to publish letters is assumed unless the author indicates otherwise.

Bulletin of the American College of Surgeons (ISSN 0002-8045) is published monthly by the American College of Surgeons, 633 N. Saint Clair St., Chicago, IL 60611. It is distributed without charge to Fellows, Associate Fellows, Resident and Medical Student Members, Affiliate Members, and to medical libraries and allied health personnel. Periodicals postage paid at Chicago, IL, and additional mailing offices. POSTMASTER: Send address changes to *Bulletin of the American College of Surgeons,* 3251 Riverport Lane, Maryland Heights, MO 63043. Canadian Publications Mail Agreement No. 40035010. Canada returns to: Station A, PO Box 54, Windsor, ON N9A 6J5.

The American College of Surgeons' headquarters is located at 633 N. Saint Clair St., Chicago, IL 60611-3211; tel. 312-202-5000; toll-free: 800-621-4111; e-mail: postmaster@facs.org; website: *facs.org.* Washington, DC, Office is located at 20 F Street N.W. Suite 1000, Washington, DC. 20001-6701; tel. 202-337-2701; website: *www.tmiva.net/20fstreetcc/home.*

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Library of Congress number 45-49454. Printed in the USA. Publications Agreement No. 1564382.

DEDICATION

This compendium, *Strategies to Enhance Survival in Active Shooter and Intentional Mass Casualty Events,* is dedicated to Dr. Norman E. McSwain

Immediately following the active shooter disaster at the Sandy Hook Elementary School in Newtown, CT, Dr. McSwain agreed to be a founding member of the Joint Committee to Develop a National Policy to Increase Survival from Active Shooter and Intentional Mass Casualty Events. He brought the dedication, passion, and intellect for which he was famous to the Hartford Consensus deliberations. He fiercely advocated for an organized coordinated prehospital response that incorporated hemorrhage control by immediate bystander responders, a change in focus of the mission of law enforcement to include immediate stopping of life-threatening hemorrhage of victims, and an urgent response by emergency medical personnel to treat and transport trauma patients to the appropriate trauma hospitals. He recognized that time was a critical factor for patients who had massive bleeding.

Dr. McSwain has had a lifelong commitment to improving the care of trauma patients. He has personally cared for thousands of trauma patients irrespective of who they were and what their station in life was. His dedication and commitment to the education of prehospital personnel was exemplified by the creation of the Prehospital Trauma Life Support course which has been taught to more than a million students in more than 60 countries. These principles have also been embraced by the military in the Tactical Combat Casualty Care courses. Through this work, his commitment to excellent prehospital care has been given to millions of trauma patients worldwide.

Throughout his career Dr. McSwain has been honored by the American College of Surgeons Committee on Trauma and numerous other professional organizations. However, it is his personal commitment to excellent individual care of the patient, his personal example of the compassionate trauma surgeon, and his kind, caring desire to help people from all walks of life that will always be remembered.

He was a good friend, an excellent person, and an example for all of us that will be forever captured by his greeting to everyone: "What have you done for the good of mankind today?"

May he rest in peace.

Lenworth M. Jacobs, Jr., MD, MPH, FACS
Chairman, Hartford Consensus

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Contributors*

*Titles and locations current at the time articles were submitted for publication.

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d

g

e

h

BARACK H. OBAMA
(a) Mr. Obama is President of the United States.

JOSEPH R. BIDEN, JR.
(b) Mr. Biden is Vice-President of the United States.

KATHRYN H. BRINSFIELD, MD, MPH, FACEP
(c) Dr. Brinsfield is Assistant Secretary for Health Affairs and Chief Medical Officer, Department of Homeland Security (DHS), Office of Health Affairs (OHA), Washington, DC. She served as Acting Assistant Secretary of the OHA and Acting Chief Medical Officer of DHS (2013–2015). She was detailed to the National Security staff as the Director of Medical Preparedness Policy (2012–2013).

KARYL J. BURNS, RN, PhD
(d) Dr. Burns is a research scientist at Hartford Hospital, CT. Previously, she was a tenured associate professor of nursing and director of the Center for Nursing Research at the University of Connecticut, Storrs. She has written or contributed to numerous peer-reviewed publications on surgical education, including the development of the Advanced Trauma Operative Management® (ATOM®)course, preparation for responses to terrorism, and end-of-life care in trauma.

FRANK K. BUTLER, JR., MD, FAAO, FUHM
(e) Dr. Butler is Chair of the Department of Defense (DoD) Committee on Tactical Combat Casualty Care, Joint Trauma System, Washington, DC. He also co-chairs the Decompression Sickness and Arterial Gas Embolism Treatment Committee for the Undersea and Hyperbaric Medical Society. As director of the SEAL Biomedical Research Program for 15 years, he has led landmark projects, including programs to promote refractive surgery in the military, the Naval Special Warfare decompression computer, and Tactical Combat Casualty Care. He is a retired Captain, Medical Corps., U.S. Navy.

RICHARD H. CARMONA, MD, MPH, FACS
(f) Dr. Carmona served as the 17th U.S. Surgeon General (2002–2006). He is vice-chairman of Canyon Ranch, chief executive officer of Canyon Ranch Health Division, and president of the Canyon Ranch Institute, Tucson, AZ. He also is distinguished professor, Mel and Enid Zuckerman College of Public Health, University of Arizona, Tucson.

ALEXANDER L. EASTMAN, MD, MPH, FACS
(g) Dr. Eastman is assistant professor of surgery, University of Texas Southwestern Medical Center; chief of trauma and attending surgeon, Parkland Memorial Hospital; lieutenant and deputy medical director, Dallas Police Department; and medical director and Surgeon Rapid Response Team surgeon/inspector, The University of Texas System Police, Dallas.

WILLIAM P. FABBRI, MD, FACEP
(h) Dr. Fabbri is medical director of operational medicine, Federal Bureau of Investigation. He has served in both field- and hospital-based capacities in industrial and transportation accidents, natural disasters, and law enforcement critical incidents.

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Contributors *continued*

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j

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m

n

JOHN B. HOLCOMB, MD, FACS
(i) Dr. Holcomb is director, Center for Translational Injury Research; vice-chair and professor, department of surgery; and chief, division of acute care surgery, University of Texas Health Science Center, Houston. He has served on the Tactical Combat Casualty Care Committee for the last decade, guiding the training and equipment needs for the DoD and many Western countries.

DAVID B. HOYT, MD, FACS
(j) Dr. Hoyt is Executive Director, American College of Surgeons (ACS), Chicago, IL. Previously, he chaired the ACS Committee on Trauma (COT) and is a former Medical Director of ACS Trauma Programs. He has served as faculty of the ACS Advanced Trauma and Life Support® course. He is former chairman, department of surgery; executive vice-dean, school of medicine; and John E. Connolly Professor of Surgery, University of California, Irvine.

LENWORTH M. JACOBS, JR., MD, MPH, FACS
(k) Dr. Jacobs is Chair, Hartford Consensus Committee, and is vice-president of academic affairs, chief academic officer, and director of the Trauma Institute, Hartford Hospital. He is assistant dean of education, professor of surgery, and chairman of traumatology and emergency medicine, University of Connecticut. Dr. Jacobs is an ACS Regent and is founder of the ATOM course and Editor of the ATOM textbook.

MATTHEW J. LEVY, DO, MSC, FACEP
(l) Dr. Levy is a member of the faculty, department of emergency medicine, Johns Hopkins University School of Medicine. He has served on a variety of local, state, and federal committees and agencies related to emergency medical and disaster care. He is a senior medical officer with the Johns Hopkins Center for Law Enforcement Medicine.

NORMAN E. MCSWAIN, JR., MD, FACS
(m) Dr. McSwain was a trauma surgeon at Tulane University School of Medicine, department of surgery, and Charity Hospital, New Orleans, LA. The city of New Orleans recruited him to develop an emergency medical system for the city, and he initiated both the emergency medical technician (EMT) basic and EMT paramedic training within the New Orleans Police Department and a citywide emergency medical system.

ERNEST (ERNIE) MITCHELL, JR., MPA
(n) Mr. Mitchell is the Federal Emergency Management Agency's U.S. Fire Administrator for the U.S. Fire Administration. He began his tenure on December 5, 2011, and is responsible for managing the U.S. Fire Administration's programs and training activities at the National Emergency Training Center, Emmitsburg, MD.

continued on next page

Contributors *continued*

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p

q

r

s

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KEVIN C. O'CONNOR, MD
(o) A trained U.S. Army Flight Surgeon, Dr. O'Connor has served as a White House physician since 2006 and, in February 2009, was appointed Physician to the Vice-President of the United States.

PETER RHEE, MD, MPH, FACS, FCCM
(p) Dr. Rhee is chief of trauma, critical care, burns, and emergency surgery; professor of surgery; and the Martin Gluck Endowed Chair, department of surgery, University of Arizona, Tucson. Dr. Rhee is a retired U.S. Navy Captain and a founding member of the Tactical Combat Casualty Care Committee.

RONALD M. STEWART, MD, FACS
(q) Dr. Stewart is professor of surgery and anesthesia and Dr. Witten B. Russ Chair in Surgery, department of surgery, and director of trauma service, University of Texas Health Science Center, San Antonio. He has served as the board chair of the Southwest Texas Regional Advisory Council for Trauma since 1996. He is Chair of the ACS COT.

ANDREW L. WARSHAW, MD, FACS
(r) Dr. Warshaw is the W. Gerald Austen Distinguished Professor of Surgery at Harvard Medical School and surgeon-in-chief and chairman emeritus, department of surgery, Massachusetts General Hospital. He is a senior consultant for international and regional clinical relations at Massachusetts General Hospital and Partners HealthCare, Boston. He is President of the ACS.

LEONARD WEIRETER, MD, FACS
(s) Dr. Weireter is the Arthur and Marie Kirk Family Professor of Surgery, Eastern Virginia Medical School, Norfolk. Dr. Weireter has chaired the oversight committee responsible for trauma care in Virginia and is Chair of the ACS COT Disaster and Mass Casualty Management Committee.

JONATHAN WOODSON, MD, FACS
(t) Dr. Woodson is Assistant Secretary of Defense for Health Affairs, U.S. DoD. He co-chairs the Armed Services Biomedical Research Evaluation and Management Committee, which facilitates oversight of DoD biomedical research.

Increasing survival, enhancing citizen resilience

by David B. Hoyt, MD, FACS
Executive Director, American College of Surgeons

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has."

—Margaret Mead

The story of the Hartford Consensus illustrates very well this famous quote from Margaret Mead.

Following the events at Sandy Hook Elementary School, in Newtown, CT, Lenworth M. Jacobs, Jr., MD, FACS, a surgical leader and dedicated trauma surgeon, reached out to me with his concerns regarding the pattern of injury that was seen in the casualties. He personally embarked on a comprehensive review of the injuries and, through this examination process, determined that providing first responders with more ready access to the sites of active shooter and mass casualty events could have a positive impact on survival.

Dr. Jacobs then followed classic principles of innovation and inclusion, assembling a world-class team of government and health care leaders, including representatives from the White House; the National Security Council; the Department of Homeland Security; the Federal Emergency Management Agency; law enforcement, including the Federal Bureau of Investigation; the Department of Defense; and prehospital and physician provider organizations.

These individuals convened in Hartford, CT, on three occasions to evaluate the issues. They developed what has become known as the Hartford Consensus, creating a protocol for national policy to enhance survivability from active shooter and intentional mass casualty events. The committee's first report, the Hartford Consensus, established a new algorithm for initial response to deadly injury: THREAT, which is built on the concept of ***T***hreat suppression, ***H***emorrhage control, ***R***apid ***E***xtrication to safety, ***A***ssessment by medical providers, and ***T***ransport to definitive care.

The latest report, the Hartford Consensus III, focuses largely on immediate responders, such as bystanders, and what they can do to stop bleeding and prevent mortality. This report has broad implications for public education that will enable these individuals to perform lifesaving interventions. By teaching everyone the challenges of uncontrollable hemorrhage and the basic principles of stopping bleeding, lives will be saved. The military health system's experience in our nation's recent conflicts in Iraq and Afghanistan and the civilian population's experience with mass casualty events have affirmed the opportunity and need for this program.

The wisdom of Dr. Jacobs' leadership is not only in the identification of the need for this program, but also in the inclusion of all interested parties, which has generated buy-in, contributions to the ultimate product, and consensus on the importance of addressing this issue. Just as bystander training in cardiopulmonary resuscitation has contributed to a reduction in mortality following cardiac arrest, the Hartford Consensus will be viewed historically as bringing hemorrhage control and its feasibility to a common denominator of the lay public. It will serve as a shining example of how a small group of thoughtful, committed citizens can, in fact, change the world. ♦

Letter from the Vice-President

by Joseph R. Biden, Jr., Vice-President of the United States
The White House, Washington, DC

When tragedy strikes anywhere in this nation, the willingness and capability of everyday citizens to take action instead of being passive bystanders can mean the difference between life or death.

With very little training and equipment, the individuals closest to the scene of an accident or mass casualty situation can control bleeding until first responders arrive to take over treatment.

This report is a call to action for every person to take responsibility for learning the basics about how to respond to uncontrolled bleeding and to put those lessons into use when circumstances have placed them in a position to help.

Just like training programs and public awareness campaigns regarding cardiopulmonary resuscitation and the Heimlich Maneuver have helped save countless lives over the past few decades, a national plan of action regarding how to maximize survivability for victims of a mass casualty situation has the potential to increase the resilience and readiness of our nation to the threats that now confront us.

And just as the experiences of the battlefield have forced advances in medical and surgical science for generations, the hard won experiences of our nation's combat medical teams show the opportunities and limitations of existing methods to stabilize and treat victims of external hemorrhage and trauma under extreme circumstances.

These methods and lessons can and must be applied to civilian life in order to meet the National Preparedness Goal established by President Obama, and increase the resiliency of our communities to unexpected tragedies.

The panel of experts assembled as part of the Joint Committee to Create a National Policy to Enhance Survivability from Active Shooter and Intentional Mass Casualty Events draws on an extraordinary breadth of experience and expertise.

The Committee, chaired by Lenworth M. Jacobs, Jr., MD, FACS, of the American College of Surgeons, includes academics and practitioners, civilians and members of the military, representatives of the highest levels of government across agencies and within the White House, including my personal physician.

I want to thank each of the participants for the dedication and professionalism they have shown in pursuit of that goal, and I am confident that their work will save lives.

The common sense recommendations within this report have the potential to equip citizens with the skills to respond, and the confidence to know they can—and must—make a difference. ♦

JOE BIDEN
Vice-President of the United States

The common sense recommendations within this report have the potential to equip citizens with the skills to respond, and the confidence to know they can—and must—make a difference.

Presidential Policy Directive: National preparedness

by Barack H. Obama, President of the United States
The White House, Washington, DC

National preparedness

This directive is aimed at strengthening the security and resilience of the U.S. through systematic preparation for the threats that pose the greatest risk to the security of the Nation, including acts of terrorism, cyber-attacks, pandemics, and catastrophic natural disasters. Our national preparedness is the shared responsibility of all levels of government, the private and nonprofit sectors, and individual citizens. Everyone can contribute to safeguarding the Nation from harm. As such, while this directive is intended to galvanize action by the Federal Government, it is also aimed at facilitating an integrated, all-of-Nation, capabilities-based approach to preparedness.

Therefore, I hereby direct the development of a national preparedness goal that identifies the core capabilities necessary for preparedness and a national preparedness system to guide activities that will enable the Nation to achieve the goal. The system will allow the Nation to track the progress of our ability to build and improve the capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation.

The Assistant to the President for Homeland Security and Counterterrorism shall coordinate the interagency development of an implementation plan for completing the national preparedness goal and national preparedness system. The implementation plan shall be submitted to me within 60 days from the date of this directive, and shall assign departmental responsibilities and delivery timelines for the development of the national planning frameworks and associated interagency operational plans described below.

National preparedness goal

Within 180 days from the date of this directive, the Secretary of Homeland Security shall develop and submit the national preparedness goal to me, through the Assistant to the President for Homeland Security and Counterterrorism. The Secretary shall coordinate this effort with other executive departments and agencies, and consult with State, local, tribal, and territorial governments, the private and nonprofit sectors, and the public.

The national preparedness goal shall be informed by the risk of specific threats and vulnerabilities—taking into account regional variations—and include concrete, measurable, and prioritized objectives to mitigate that risk. The national preparedness goal shall define the core capabilities necessary to prepare for the specific types of incidents that pose the greatest risk to the security of the Nation, and shall emphasize actions aimed at achieving an integrated, layered, and all-of-Nation preparedness approach that optimizes the use of available resources. The national preparedness goal shall reflect the policy direction outlined in the National Security Strategy (May 2010), applicable Presidential Policy Directives, Homeland Security Presidential Directives, National Security Presidential Directives, and national strategies, as well as guidance from the Interagency Policy Committee process. The goal shall be reviewed regularly to evaluate consistency with these policies, evolving conditions, and the National Incident Management System.

National preparedness system

The national preparedness system shall be an integrated set of guidance, programs, and processes that will enable the Nation to meet the national preparedness goal. Within 240 days from the date of this directive, the Secretary of Homeland Security shall develop and

The national preparedness goal shall be informed by the risk of specific threats and vulnerabilities—taking into account regional variations—and include concrete, measurable, and prioritized objectives to mitigate that risk.

submit a description of the national preparedness system to me, through the Assistant to the President for Homeland Security and Counterterrorism. The Secretary shall coordinate this effort with other executive departments and agencies, and consult with State, local, tribal, and territorial governments, the private and nonprofit sectors, and the public.

The national preparedness system shall be designed to help guide the domestic efforts of all levels of government, the private and nonprofit sectors, and the public to build and sustain the capabilities outlined in the national preparedness goal. The national preparedness system shall include guidance for planning, organization, equipment, training, and exercises to build and maintain domestic capabilities. It shall provide an all-of-Nation approach for building and sustaining a cycle of preparedness activities over time.

The national preparedness system shall include a series of integrated national planning frameworks, covering prevention, protection, mitigation, response, and recovery. The frameworks shall be built upon scalable, flexible, and adaptable coordinating structures to align key roles and responsibilities to deliver the necessary capabilities. The frameworks shall be coordinated under a unified system with a common terminology and approach, built around basic plans that support the all-hazards approach to preparedness and functional or incident annexes to describe any unique requirements for particular threats or scenarios, as needed. Each framework shall describe how actions taken in the framework are coordinated with relevant actions described in the other frameworks across the preparedness spectrum.

The national preparedness system shall include an interagency operational plan to support each national planning framework. Each interagency operational plan shall include a more detailed concept of operations; description of critical tasks and responsibilities; detailed resource, personnel, and sourcing requirements; and specific provisions for the rapid integration of resources and personnel.

All executive departments and agencies with roles in the national planning frameworks shall develop department-level operational plans to support the interagency operational plans, as needed. Each national planning framework shall include guidance to support corresponding planning for State, local, tribal, and territorial governments.

The national preparedness system shall include resource guidance, such as arrangements enabling the ability to share personnel. It shall provide equipment guidance aimed at nationwide interoperability;

Our national preparedness is the shared responsibility of all levels of government, the private and nonprofit sectors, and individual citizens. Everyone can contribute to safeguarding the Nation from harm. As such, while this directive is intended to galvanize action by the Federal Government, it is also aimed at facilitating an integrated, all-of-Nation, capabilities-based approach to preparedness.

The national preparedness system shall be designed to help guide the domestic efforts of all levels of government, the private and nonprofit sectors, and the public to build and sustain the capabilities outlined in the national preparedness goal.

and shall provide guidance for national training and exercise programs, to facilitate our ability to build and sustain the capabilities defined in the national preparedness goal and evaluate progress toward meeting the goal.

The national preparedness system shall include recommendations and guidance to support preparedness planning for businesses, communities, families, and individuals.

The national preparedness system shall include a comprehensive approach to assess national preparedness that uses consistent methodology to measure the operational readiness of national capabilities at the time of assessment, with clear, objective, and quantifiable performance measures, against the target capability levels identified in the national preparedness goal.

Building and sustaining preparedness

The Secretary of Homeland Security shall coordinate a comprehensive campaign to build and sustain national preparedness, including public outreach and community-based and private-sector programs to enhance national resilience, the provision of Federal financial assistance, preparedness efforts by the Federal Government, and national research and development efforts.

National preparedness report

Within one year from the date of this directive, the Secretary of Homeland Security shall submit the first national preparedness report based on the national preparedness goal to me, through the Assistant to the President for Homeland Security and Counterterrorism. The Secretary shall coordinate this effort with other executive departments and agencies and consult with State, local, tribal, and territorial governments, the private and nonprofit sectors, and the public. The Secretary shall submit the report annually in sufficient time to allow it to inform the preparation of my Administration's budget.

Roles and responsibilities

The Assistant to the President for Homeland Security and Counterterrorism shall periodically review progress toward achieving the national preparedness goal.

The Secretary of Homeland Security is responsible for coordinating the domestic all-hazards preparedness efforts of all executive departments and agencies, in consultation with State, local, tribal, and territorial governments, nongovernmental organizations, private-sector partners, and the general public; and for developing the national preparedness goal.

The heads of all executive departments and agencies with roles in prevention, protection, mitigation, response, and recovery are responsible for national preparedness efforts, including department-specific operational plans, as needed, consistent with their statutory roles and responsibilities.

Nothing in this directive is intended to alter or impede the ability to carry out the authorities of executive departments and agencies to perform their responsibilities under law and consistent with applicable legal authorities and other Presidential guidance. This directive shall be implemented consistent with relevant authorities, including the Post-Katrina Emergency Management Reform Act of 2006 and its assignment of responsibilities with respect to the Administrator of the Federal Emergency Management Agency.

Nothing in this directive is intended to interfere with the authority of the Attorney General or Director of the Federal Bureau of Investigation with regard to the direction, conduct, control, planning, organization, equipment, training, exercises, or other activities concerning domestic counterterrorism, intelligence, and law enforcement activities.

Nothing in this directive shall limit the authority of the Secretary of Defense with regard to the command and control, planning, organization, equipment, training, exercises, employment, or other activities of Department of Defense forces, or the allocation of Department of Defense resources.

The national preparedness system shall include recommendations and guidance to support preparedness planning for businesses, communities, families, and individuals.

If resolution on a particular matter called for in this directive cannot be reached between or among executive departments and agencies, the matter shall be referred to me through the Assistant to the President for Homeland Security and Counterterrorism.

This directive replaces Homeland Security Presidential Directive (HSPD)-8 (National Preparedness), issued December 17, 2003, and HSPD-8 Annex I (National Planning), issued December 4, 2007, which are hereby rescinded, except for paragraph 44 of HSPD-8 Annex I. Individual plans developed under HSPD-8 and Annex I remain in effect until rescinded or otherwise replaced.

Definitions

For the purposes of this directive:

- The term "national preparedness" refers to the actions taken to plan, organize, equip, train, and exercise to build and sustain the capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation.

- The term "security" refers to the protection of the Nation and its people, vital interests, and way of life.

- The term "resilience" refers to the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies.

- The term "prevention" refers to those capabilities necessary to avoid, prevent, or stop a threatened or actual act of terrorism. Prevention capabilities include, but are not limited to, information sharing and warning; domestic counterterrorism; and preventing the acquisition or use of weapons of mass destruction (WMD). For purposes of the prevention framework called for in this directive, the term "prevention" refers to preventing imminent threats.

- The term "protection" refers to those capabilities necessary to secure the homeland against acts of terrorism and manmade or natural disasters. Protection capabilities include, but are not limited to, defense against WMD threats; defense of agriculture and food; critical infrastructure protection; protection of key leadership and events; border security; maritime security; transportation security; immigration security; and cybersecurity.

- The term "mitigation" refers to those capabilities necessary to reduce loss of life and property by lessening the impact of disasters. Mitigation capabilities include, but are not limited to, community-wide risk reduction projects; efforts to improve the resilience of critical infrastructure and key resource lifelines; risk reduction for specific vulnerabilities from natural hazards or acts of terrorism; and initiatives to reduce future risks after a disaster has occurred.

- The term "response" refers to those capabilities necessary to save lives, protect property and the environment, and meet basic human needs after an incident has occurred.

- The term "recovery" refers to those capabilities necessary to assist communities affected by an incident to recover effectively, including, but not limited to, rebuilding infrastructure systems; providing adequate interim and long-term housing for survivors; restoring health, social, and community services; promoting economic development; and restoring natural and cultural resources.

BARACK OBAMA
President of the United States

A systematic response to mass trauma: The public, organized first responders, and the American College of Surgeons

by Andrew L. Warshaw, MD, FACS, FRCSEd(Hon),
President, American College of Surgeons

The American College of Surgeons (ACS), through its Committee on Trauma, has worked for more than 40 years to improve the outcomes of traumatic injury through the development and accreditation of trauma centers and organized systems of trauma care throughout the U.S. Data from trauma centers are collected in the National Trauma Data Bank® to allow continuous evaluation and improvement of the care of injured patients. The Committee on Trauma also has a long track record in educating emergency technicians, paramedics, and surgeons through its courses in Prehospital Trauma Life Support and Advanced Trauma Life Support®.

Recognizing that increasing survivability after mass casualty events, such as the shootings at the Sandy Hook Elementary School in 2012 and the Boston Marathon bombing in 2013, must become a national priority, the ACS joined with a group of trauma surgeons and representatives of organized first responders from law enforcement, fire departments, emergency medical services, and the military who came together to frame an improved response system. Their deliberations, published as the Hartford Consensus, recommended an integrated response directed primarily at the control of life-threatening hemorrhage, as specified in the acronym THREAT (***T***hreat suppression, ***H***emorrhage control, ***R***apid ***E***xtrication to safety, ***A***ssessment by medical providers, and ***T***ransport to definitive care).

A focus of the Hartford Consensus was extremity wounds and the use of kits containing tourniquets and hemostatic dressings on the one hand, and better coordination between law enforcement and medical teams in the triage of their efforts on the other.

In a follow-up meeting several months later, an expanded group of participants, the Hartford Consensus II, advanced the concept that the public—uninjured bystanders or minimally injured victims—can have a critical role as rescuers. Along with the organized first responders of law enforcement, emergency medical services, and fire/rescue services, the public should be trained in the techniques of hemorrhage control with a focus on the use of tourniquets, pressure dressings, and hemostatic agents until transport and definitive treatment can be implemented. An important component of their thinking was that some lives may currently be lost through caution: the standard approach is to cordon off the zone of casualties, a wide "hot zone," until it has been ensured that all threats have been suppressed. It was suggested that the plan should be modified to allow earlier access to victims outside the real hot zone, the location of the active shooter or possible bomb. Agreement on new systems of integration and coordination between law enforcement and other teams of responders is needed to ensure the mutual understanding and sequencing of roles.

Hartford Consensus III, which met in April 2015, was further expanded with representatives from the Department of Defense, the National Security Council, the Federal Emergency Management Agency, the Department of Homeland Security, the ACS, and the public. The tenets of the previous consensus conferences were upheld, but there was a critical addition: an emphasis on the role of the immediate responder—the inadvertent bystander—in controlling life-threatening external hemorrhage.

Organized first responders

Organized first responders—including members of law enforcement, fire services, and emergency medical services—can be equipped with hemorrhage control kits containing tourniquets and hemostatic aids. Combat soldiers do not go out on the battlefield

Agreement on new systems of integration and coordination between law enforcement and other teams of responders is needed to ensure the mutual understanding and sequencing of roles.

without such kits. However, the public bystander who happens to be at the scene will not have immediate access to a formal tourniquet even if a kit could be placed in the trunk of every car or on the wall beside every automatic electrical defibrillator. The window of opportunity to save a life by controlling major arterial hemorrhage from an extremity wound may be as short as five minutes; there is no time to run to the car or find the location of a wall-mounted kit. Bystanders should be trained and empowered (given "permission," as William Fabbri, MD, FACEP, Director of Operational Medicine of the Federal Bureau of Investigation, said) to go forward immediately—before and until a tourniquet kit can be found—and apply pressure to stem the bleeding temporarily until a tourniquet can be applied or use a belt or article of clothing as a makeshift tourniquet (the latter method is somewhat controversial). Lives were saved by such actions following the Boston Marathon bombing. Every bystander carries a set of tools at all times to control hemorrhage: his or her hands. Training in hemorrhage control should take its place alongside training to perform cardiopulmonary resuscitation or the Heimlich maneuver. As concluded in the Hartford Consensus III, immediate responders—the public bystanders—must follow the injunction "See Something, Do Something"; stated otherwise, "Stop the Hemorrhage; Save a Life."

Next steps?

The messages of the Hartford Consensus Conferences need to be disseminated to major organizations, including the business community, and to the public. These groups—all of us—must be educated and trained in the imperatives and techniques of immediate response to catastrophic injury, particularly the control of life-threatening hemorrhage. To this end, the ACS, with the endorsement of its Board of Regents, is jointly sponsoring this compendium with the National Security Council, which has been charged by the White House to develop a policy to enhance the resiliency of the American public. It is intended that the present document will move the agenda forward. ♦

Recognizing that increasing survivability after mass casualty events, such as the shootings at the Sandy Hook Elementary School in 2012 and the Boston Marathon bombing in 2013, must become a national priority, the ACS joined with a group of trauma surgeons and representatives of organized first responders from law enforcement, fire departments, emergency medical services, and the military who came together to frame an improved response system.

Strategies to enhance survival in active shooter and intentional mass casualty events

by Lenworth M. Jacobs, Jr., MD, MPH, FACS
Chairman, Hartford Consensus
Vice-President, Academic Affairs, Hartford Hospital
Member, Board of Regents, American College of Surgeons

This compendium, Strategies to Enhance Survival in Active Shooter and Intentional Mass Casualty Events, has been developed to provide evidence to support techniques that will enhance survivability from active shooter and intentional mass casualty events. This publication was created in response to the Presidential Policy Directive aimed at strengthening the security and resilience of the U.S. through a collaborative effort to be prepared for threats to the security of the nation and its citizens. The national preparedness goal reflects policy outlined in National Security strategy, Department of Homeland Security Presidential Directives, and National Security Presidential Directives. A component of preparedness is ensuring that there is a comprehensive, fully integrated system to manage the victims of active shooter and intentional mass casualty events. The most common cause of mortality from these events is hemorrhage. This compendium focuses on the response of the government and the private sector to implement methods that will decrease death due to uncontrolled bleeding.

The compendium is the result of meetings convened by the National Security Council, as well as other government agencies and private-sector organizations. A number of roundtable meetings were convened by the National Security Council to educate and generate a discussion from more than 50 organizations representing organized medicine, emergency medical services, fire/rescue services, law enforcement, organized nursing, and others involved in responding to injured citizens. The compendium is designed to be an educational platform for organizations interested and involved in the management and care of injured victims, as well as organizations that may be at risk for active shooter and intentional mass casualty events.

The Hartford Consensus documents contained in the compendium represent the deliberations of the Joint Committee to Create a National Policy to Enhance Survivability from Active Shooter and Intentional Mass Casualty Events. The committee was founded by the American College of Surgeons in collaboration with the medical community and representatives from the federal government; National Security Council; U.S. military; Federal Bureau of Investigation; and police, fire, and emergency medical organizations. Other organizations that are committed to providing emergency medical intervention, such as the American College of Emergency Physicians, have been invaluable in developing the agenda of increasing survival from these events. Members of the American College of Emergency Physicians played an important role in the deliberations. The Hartford Consensus document presents a call to action that no one should die from uncontrolled bleeding.

The Hartford Consensus members recognized that active shooter and intentional mass casualty events require multiple responders from different agencies with different organizational structures and lines of authority. These differing structures can result in unclear lines of command and delays in effective therapy. Furthermore, different organizations have different missions. The right organizations with the right missions must be in place for effective management. These complex organizational interactions are not problematic in non–life-threatening nonemergency situations. However, when victims are actively hemorrhaging, extreme clarity of mission and immediate coordinated actions are required.

The Joint Committee to Create a National Policy to Enhance Survivability from Active Shooter and Intentional Mass Casualty Events includes representation from the federal government, fire/rescue and

It is the intent of this compendium to assist the Presidential Policy Directives in strengthening the security and resilience of U.S. citizens.

emergency medical services, the military, and hospitals. Early on it became obvious that the groups represented would have to modify, relinquish, or assume new responsibilities to achieve the goal of increasing survivability. All three of the Hartford Consensus documents reflect the spirit of compromise from these multiple agencies and jurisdictions. The recommendations from the Hartford Consensus have been well received.

This compendium reflects statements from the stakeholders involved in the process. It contains discussions with supporting evidence from the U.S. Department of Homeland Security, the Federal Emergency Management Agency, and the U.S. Fire Administration. The 17th Surgeon General has commented on the use of unique strategies to educate the public in the principles of the Hartford Consensus. The medical director of emergency medical services of the Federal Bureau of Investigation has outlined the continuing threat from intentional mass casualty events in the U.S. The role of medical response by law enforcement has been delineated. Lessons learned from military experiences and how these lessons should be applied to the civilian sectors are discussed. The use of equipment and devices that are essential to stop life-threatening bleeding is described. The implications for prehospital emergency hospital systems and their role in intentional mass casualty events, along with the importance of educating professional responders and the public, are discussed. Finally, an example of how a state has implemented the directives of the Hartford Consensus is outlined.

The complexity and diversity of a country as large as the U.S. represents a significant implementation challenge. However, it is the intent of this compendium to assist the Presidential Policy Directives in strengthening the security and resilience of U.S. citizens. It is through these coordinated responses involving the public and organized service personnel that we can enhance survivability from active shooter and intentional mass casualty events. ♦

Early on it became obvious that the groups represented would have to modify, relinquish, or assume new responsibilities to achieve the goal of increasing survivability. All three of the Hartford Consensus documents reflect the spirit of compromise from these multiple agencies and jurisdictions.

Roundtable meetings

A number of roundtable meetings were convened by the National Security Council to educate and generate a discussion from more than 50 organizations representing organized medicine, emergency medical services, fire services, law enforcement, organized nursing, and numerous other stakeholders involved in responding to injured citizens. It was designed to be an educational platform for organizations interested and involved in the management and care of injured victims as well as organizations that may be at risk for active shooter or intentional mass casualty events.

Physicians roundtable—February 10, 2015

Bystanders: Our nation's immediate responders

On February 10, 2015, physician leaders of major medical organizations along with key federal personnel and National Security Council (NSC) staff participated in a Physicians Roundtable on a national initiative, Bystanders: Our Nation's Immediate Responders. This medical preparedness initiative is a direct response to Presidential Policy Directive 8 (National Preparedness). The meeting was held at the Eisenhower Executive Office Building at the White House. The goal of the initiative is to build national resilience by better preparing the general public to save lives by raising public awareness of techniques that can save lives by taking such basic actions as stopping life-threatening bleeding. Our national preparedness is the shared responsibility of all levels of government, the private and not-for-profit sectors, and individual citizens. As we have seen in such recent tragic incidents as the Boston Marathon bombings, anyone can contribute to safeguarding the nation from harm. At the meeting, convened by NSC staff, participants in the federal interagency Bystander Workgroup reviewed progress on the initiative and received valuable input from physician leaders. There was unanimous, broad support for the Bystander initiative from heads of major national physicians' organizations.

continued on page 20

FEBRUARY 10, 2015 INVITEES

- Andrew Warshaw, MD, FACS, FRCSEd(Hon)
  President
  American College of Surgeons
- Lenworth M. Jacobs, Jr., MD, MPH, FACS
  American College of Surgeons
  Chairman, Hartford Consensus
- Robert Wah, MD
  President
  American Medical Association
- Frederick Azar, MD
  President
  American Academy of Orthopaedic Surgeons
- Michael Gerardi, MD
  President
  American College of Emergency Physicians
- Robert O'Connor, MD
  American College of Emergency Physicians
- Robert Wergin, MD
  President
  American Academy of Family Physicians
- Julie Wood, MD
  American Academy of Family Physicians
- David Fleming, MD
  President
  American College of Physicians
- Kathleen Weber, MD
  President-Elect
  Major League Baseball Team Physicians Society
- Ritu Sahni, MD
  Immediate Past-President
  National Association of EMS Physicians
- Alex Isakov, MD
  National Association of EMS Physicians
- Jon Divine, MD
  Incoming President
  American Medical Society for Sports Medicine
- Francis O'Connor, MD
  American Medical Society for Sports Medicine
- Malika Fair, MD
  Association of American Medical Colleges
- Gregory Christiansen, MD
  American Osteopathic Association
- Ray Quintero, MD
  American Osteopathic Association
- Scott Needle, MD
  American Academy of Pediatrics
- Roger Mitchell, MD
  National Association of Medical Examiners
- Tony Casolaro, MD
  National Football League Physicians Society
- Rand Beers
  Deputy Assistant to the President and Deputy Homeland Security Advisor
- Ronny Jackson, MD
  Physician to the President
- Kevin O'Connor, MD
  Physician to the Vice-President
- Beth Cameron
  National Security Council Staff
- Richard Hunt, MD
  National Security Council Staff
- Larry Kerr
  National Security Council Staff
- Heather King
  National Security Council Staff
- Chris Music
  Office of Management and Budget
- Carole Nicholson
  Domestic Policy Council
- Leslie Sharfmann
  Office of Administration
- Cathy Gotschall
  National Highway Traffic Safety Administration
  Department of Transportation
- Rich Serino
  Past Deputy Administrator
  Federal Emergency Management Agency

INTERAGENCY BYSTANDER WORKGROUP TEAM LEADERS

- Gwen Camp
  Federal Emergency Management Agency
  Department of Homeland Security
- Brendan Carr, MD
  Office of the Assistant Secretary for Preparedness and Response
  Department of Health and Human Services
- Drew Dawson
  National Highway Traffic Safety Administration
  U.S. Department of Transportation
- Gregg Margolis, PhD, NAEMT-P
  Office of the Assistant Secretary for Preparedness and Response
  Department of Health and Human Services
- Todd Rassmussen, MD
  Colonel, U.S. Air Force Medical Corps
  Department of Defense
  Combat Casualty Care Research Program
- William Fabbri, MD, FACEP
  Federal Bureau of Investigation
  Department of Justice
- Keith Holterman
  Office of Science and Technology
  Department of Homeland Security
- William Seifarth
  Office of Health Affairs
  Department of Homeland Security
- William Walters, MD
  Office of Medical Services
  Department of State
- Scott Sasser, MD
  Federal Emergency Management Agency
  Department of Homeland Security

APRIL 29, 2015 INVITEES

- Air Medical Physician Association
- American Academy of Physician Assistants
- American Ambulance Association
- American Association of Critical Care Nurses
- American Association for the Surgery of Trauma
- American College of Emergency Physicians
- American College of Surgeons
- American Heart Association
- American Hospital Association
- American Nurses Association
- American Osteopathic Association
- American Physical Therapy Association
- American Public Health Association
- American Trauma Society
- Association of Air Medical Services
- Association of State and Territorial Health Officials
- Eastern Association for the Surgery of Trauma
- Emergency Nurses Association
- EMS Labor Alliance
- International Academies of Emergency Dispatch
- International Association of Chiefs of Police
- International Association of Emergency Managers
- International Association of Emergency Medical Services Chiefs
- International Association of Firefighters
- International Association of Fire Chiefs
- Major Cities Chiefs Association
- National Association of EMTs
- National Association of School Nurses
- National Association of State EMS Officials
- National Athletic Trainers Association
- National Emergency Management Association
- National Volunteer Fire Council
- Society of Emergency Medicine Physician Assistants
- Society of Trauma Nurses
- Trauma Center Association of America
- White House personnel
- Interagency bystander workgroup team leaders
- Federal invitees

Roundtable—April 29, 2015

Bystanders: Our nation's immediate responders

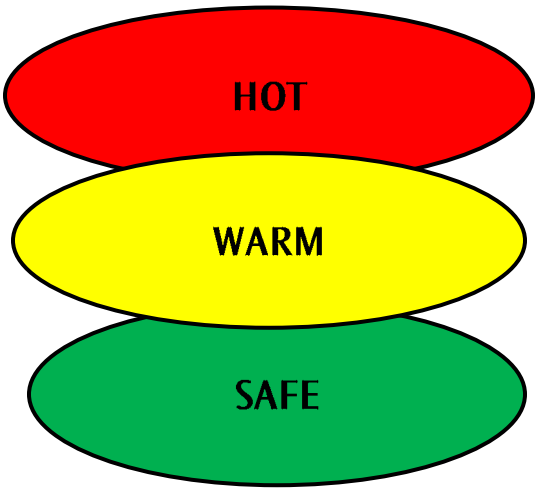
On April 29, 2015, 50 senior leaders from 35 national organizations representing 9-1-1, allied health disciplines, emergency management, EMS, fire service, law enforcement, medicine, nursing, and public health along with key federal personnel and National Security Council (NSC) staff, participated in a roundtable on a national initiative, Bystanders: Our Nation's Immediate Responders. This medical-preparedness initiative is a direct response to Presidential Policy Directive 8 (National Preparedness). The meeting was held at the Eisenhower Executive Office Building at the White House. The goal of the initiative is to build national resilience by better preparing the general public to save lives by raising awareness of techniques such as stopping life-threatening bleeding. Our national preparedness is the shared responsibility of all levels of government, the private and not-for-profit sectors, and individual citizens. As we have seen in such recent tragic incidents as the Boston Marathon bombings, anyone can contribute to safeguarding the nation from harm. At the meeting, convened by the NSC staff, members of the federal interagency Bystander Workgroup reviewed progress on the initiative and received valuable input from participants. There was unanimous support for the Bystander initiative from the participants. ♦

THREAT

The Hartford Consensus
Improving Survival from Active Shooter and Intentional Mass Casualty Events

Hot Zone	Danger	Threat Suppression
Warm Zone	Not Secure	Hemorrhage Control Rapid Extrication
Cold Zone	Safe	Assess Patient Transport to Hospital

Compressing the zones delivers care to injured victims more rapidly and facilitates earlier hemorrhage control



The military experience and integration with the civilian sector

by Jonathan Woodson, MD, FACS, Assistant Secretary of Defense for Health Affairs, Department of Defense

A famous dictum, attributed to Hippocrates, is well known in the medical community: "Above all, do no harm." But I am partial to another one: "He who wishes to be a surgeon should go to war."

For thousands of years the battlefield, unfortunately, has been the classroom where the greatest medical advances have been made—in trauma care, aeromedical evacuation, pain management, and a host of other clinical services for both injury and disease. This learning opportunity accelerated in the U.S. Civil War and then in the series of world wars and regional wars of the past century.

For the last 14 years, U.S. military forces have been engaged in prolonged conflicts in Afghanistan, Iraq, and other locations around the world. And once again, we have learned a great deal about how to train for, equip ourselves for, and manage trauma in some of the most austere environments on the planet.

Our achievements have come at great cost. More than 6,800 lives have been lost, and tens of thousands of lives have been changed forever with consequences that ripple out across communities, both civilian and military. War has changed the lives of the spouses, parents, and children of military personnel, as well as the lives of their extended network of friends and relatives.

Nonetheless, the Military Health System (MHS) has performed like no other in the history of warfare. Our system of care has achieved the highest rates of survival from wounds in the history of warfare, as well as the lowest disease/non-battle-injury rate ever achieved by any military force anywhere. We have moved hundreds of thousands of ill and injured in the air, more than 8,000 miles, more quickly and more safely than ever before.

If war is the dark side of humanity, medicine often represents hope and light.

The outcomes have occurred through discipline and a relentless assessment of what was and what was not working on the battlefield. These outcomes were

In the last 14 years there has been a dramatic increase in the number of institutions—research, academic, federal, state, and nongovernmental organizations—that have engaged with military medicine and provided their considerable knowledge to help us improve even intractable challenges.

The military's partnership over the years with the ACS is a shining example of how these partnerships can be fostered and strengthened. The military health system and the ACS share a common heritage and ethos—a focus on continuous learning that seeks to improve care for all we serve.

achieved by senior physicians with many years of training in their subspecialties. And these outcomes were also achieved by 19- and 20-year old medics and corpsmen on the front lines, serving shoulder-to-shoulder with the war fighters. These young men and women, often with only a high school diploma, received exceptional training and have been abetted by strong mentors.

It would be a mistake to assume, however, that our successes emerged purely from an internal discipline or expertise. Knowledge sharing is a two-way street. Early in the recent war, Colonel John B. Holcomb, MD, FACS, and others recognized that the establishment of a military Joint Trauma System, based on the principles promulgated by the American College of Surgeons (ACS) Committee on Trauma, was going to be essential to optimizing the strategy for saving lives on the battlefield. The data-driven Joint Trauma System promoted rapid improvement in the training, clinical practice guidelines, equipment, and organization of medical units for battlefield care.

In the last 14 years there has been a dramatic increase in the number of institutions—research, academic, federal, state, and nongovernmental organizations—that have engaged with military medicine and provided their considerable knowledge to help us improve even intractable challenges. And the MHS has worked to share its findings in civilian settings through conferences, focused symposia, and other public-private partnerships.

These military-civilian partnerships bring great thought leadership, added expertise, efficiency, and value to the MHS. Equally important, they help the military to connect with the American people. In an era when society has become more distant from military communities, the military needs its partners to be a conduit to the American people. These partnerships enhance the recruitment and retention of needed skilled personnel. The military needs our citizens to support us as we serve the needs of all citizens through our duty to care for those who protect us all. The military needs to deepen these relationships, and these relationships need to be more accessible and adaptable.

The military's partnership over the years with the ACS is a shining example of how these partnerships can be fostered and strengthened. The MHS and the ACS share a common heritage and ethos—a focus on continuous learning that seeks to improve care for all we serve.

The relationship with the ACS provides an avenue for military surgeons in all subspecialties to sustain their trauma skills at both military and civilian institutions around the country. This collaboration is as important in peacetime as in wartime. The Department of Defense has benefited greatly from participation in the ACS National Surgical Quality Improvement Program. This initiative allows us to compare our performance across a wide range of quality measures with leading civilian institutions.

This collaboration is the future of military medicine. Ongoing, close collaboration with civilian partners like the ACS is important on many levels. We both benefit from understanding what each of us is doing in our respective areas of research and operational experience, and we can accelerate the learning to our staff. Furthermore, there is inherent value in providing our civilian colleagues with insight into the unique and indispensable role of the MHS in supporting our broader national security needs.

The Hartford Consensus is a milestone achievement in bolstering collaboration in a manner that helps all Americans. I am grateful for this opportunity and the engagement of the best minds in medicine to drive our never-ending improvement. ♦

The Department of Homeland Security's role in enhancing and implementing the response to active shooter and intentional mass casualty events

by Kathryn H. Brinsfield, MD, MPH, FACEP
Assistant Secretary for Health Affairs and Chief Medical Officer
Department of Homeland Security

Ernest (Ernie) Mitchell, Jr., MPA
U.S. Fire Administrator; Federal Emergency Management Agency
Department of Homeland Security

Local emergency medical service (EMS) personnel, firefighters, rescue workers, law enforcement personnel, and bystanders present play an essential role in our nation's security and preparedness. First responders are trained to deliver critical—often lifesaving—care to the injured before they reach hospitals. They must make high-consequence decisions quickly and in coordination with responders from different agencies, jurisdictions, companies, and professional disciplines. The importance of this fast, coordinated action is underscored in the response to active shooter and intentional mass casualty events.

All too often, victims of our increasingly violent and frequent active shooter or mass casualty incidents bleed to death waiting for medical treatment. Quick actions to control external hemorrhage on the part of first responders, including those bystanders present at the point of wounding, can provide effective, lifesaving, first-line treatment in what remains the critical step in eliminating preventable prehospital death.

We applaud the Hartford Consensus call to action for cities to develop new integrated response plans, policies, procedures, and training and exercise initiatives that are customized to the needs of the community and focused on the importance of initial actions to control hemorrhage as a core requirement of the emergency response.

Department of Homeland Security support to first responders

The Department of Homeland Security (DHS) is committed to supporting our nation's first responders at all levels of government, in the private and not-for-profit sectors, and as individual citizens. The DHS coordinates the domestic all-hazards preparedness and response efforts of all executive departments and agencies—in consultation with state, local, tribal, and territorial governments; nongovernmental organizations; private-sector partners; and the general public—to enhance and implement our emergency response capabilities. When our country and citizens are threatened by active shooters and intentional mass casualty events, it is local police, fire, and EMS who keep us safe. Security begins locally. As the federal agency tasked with making us safe and secure, we at the DHS have a responsibility to engage our first responder stakeholders and provide the kind of resources they need to be safe and effective when they respond.

One of the top priorities for the DHS is to get the most accurate information, the most effective tools, and the best resources into the hands of the men and women serving on the front lines. Many areas of the DHS support these efforts, both directly and peripherally, but two key organizations working directly with the first responder community in these efforts are the U.S. Fire Administration and the Office of Health Affairs (OHA).

The U.S. Fire Administration provides national leadership and professional development for federal, state, local, territorial, and tribal fire and emergency response services. The OHA provides medical and health expertise to ensure that first responders across the nation have the medical guidance, resources, and decision support tools they need to prepare for, respond to, and recover from incidents within their communities.

Through the efforts of these two organizations, the DHS empowers first responders who are able not only to handle local safety needs but also to lead their communities in all-hazard risk reduction, prevention, response, and recovery in a manner that will save the maximum number of lives possible in an intentional mass casualty event. For example, in February 2014, the OHA held a two-day meeting at which subject-matter experts and the first responder community discussed ways to improve the survivability of victims and first responders in active shooter and improvised explosive device (IED) incidents. More broadly, the DHS

First responders…must make high-consequence decisions quickly and in coordination with responders from different agencies, jurisdictions, companies, and professional disciplines.

coordinates with other first responder stakeholders on a wide range of training and public outreach initiatives for active shooter response in collaboration with interagency partners, first responders, and community and private-sector organizations.

Recent IED and active shooter incidents have shown us that some traditional practices of first responders need to be realigned and enhanced to improve the survivability of victims and the safety of the first responders caring for them. Thus, at the request of first responders and first receivers who encounter casualties from IEDs and active shooter incidents, the White House asked the OHA to lead a multidisciplinary interagency team to develop recommendations for state and local first responders focused on improving the response to IEDs or active shooter incidents or both.

Subject matter experts from the DHS; the Departments of Defense, Health and Human Services, Justice, and Transportation; and the White House came together to study civilian IED and/or active shooter response best practices and lessons learned. The results of this effort translated evidence-based strategies from the U.S. military's vast experience in responding to and managing casualties from IED and/or active shooter incidents, as well as the military's significant investment in combat casualty care research, into the civilian first responder environment.

There should be greater coordination among EMS, fire services, and law enforcement to work more effectively during IED or active shooter incidents or both.

Key themes in responding to and managing casualties from active shooter and intentional mass casualty events

Three key themes emerged during this collaborative evaluation: early, aggressive hemorrhage control; use of protective equipment (which includes ballistic vests, helmets, and eyewear); and greater first responder interoperability and incident management. The recommendations in these areas will help to save lives by mitigating first responder risk and improving the emergent and immediate medical management of casualties encountered during IED and/or active shooter incidents.

Hemorrhage control

First, the first responders should incorporate tourniquets and hemostatic agents as part of the treatment of severe bleeding (if allowed by protocol). Tourniquets and hemostatic agents have been demonstrated to be quick and effective methods for preventing exsanguination from extremity wounds (tourniquets) and for other severe external bleeding (hemostatic agents).

Recent IED and active shooter incidents have shown us that some traditional practices of first responders need to be realigned and enhanced to improve the survivability of victims and the safety of the first responders caring for them.

Second, first responders should develop and adopt evidence-based standardized training that addresses the basic civilianized tenets of Tactical Combat Casualty Care. Training should be conducted in conjunction with fire, emergency medical services (EMS), and medical community personnel to improve interoperability during IED or active shooter incidents or both.

Use of protective equipment

First responders should develop interdomain (EMS, fire, and law enforcement) tactics, techniques, and procedures—including the use of ballistic vests, better situational awareness, and application of concealment and cover concepts—and train all first responders in their use.

Next, as technology improves, first responders should adopt proven protective measures that have been demonstrated to reliably shield personnel from IED fragments and shock waves (for example, body armor).

Finally, first responders, when dealing with either IED or active shooter incidents, must remain vigilant and aware of the potential risk posed by secondary IEDs or additional shooters.

Greater response and incident management

First, local and state law enforcement and emergency services should institutionalize National Incident Management System–based command and control language through plans and exercises, as well as during ongoing education and training.

Second, local and state EMS, law enforcement, fire, and emergency management personnel, as well as receiving medical facilities, should have interoperable radio and communications equipment.

Third, local, state, and federal partners should consider an expansion of Public Safety Answering/Access Point intake procedures to include information gathering vital to the initial response.

Fourth, training to improve first responder triaging precision is essential for dealing with IED and active shooter incidents.

Fifth, there should be greater coordination among EMS, fire services, and law enforcement to work more effectively during IED or active shooter incidents or both. The dialogue should focus on potential improvements or changes to the tactics, techniques, and procedures that have historically been used during law enforcement situations that involve a medical emergency (for example, EMS personnel wait until law enforcement personnel have secured the scene before they enter to render emergency care).

These recommendations are now available in the new DHS publication *The First Responder Guide for Improving Survivability in Improvised Explosive Device and/or Active Shooter Incidents* and can be downloaded at *www.dhs.gov/sites/default/files/publications/First%20Responder%20Guidance%20June%202015%20FINAL%202.pdf.*

This document includes several scenarios to guide local community first responder education and training efforts toward the incorporation and institutionalization of these guidelines in a variety of likely IED and/or active shooter situations.

To prepare for and reduce death and suffering following an IED detonation or active shooter event in a civilian environment, it is imperative that the lessons learned from these incidents, as well as the continuing combat medicine experience of the Department of Defense, be more widely disseminated and adopted within the U.S. civilian first responder and first receiver communities. ♦

ACTIVE SHOOTER INCIDENT CASUALTIES: 2000–2013

- Casualties (victims killed and wounded) totaled 1,043. The individual shooters are not included in this total
- A total of 486 individuals were killed
- A total of 557 individuals were wounded
- In 64 incidents (40%), the crime would have fallen within the federal definition of mass killing—defined as "three or more" killed—under the new federal statute

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

Initial management of mass-casualty incidents due to firearms:

Improving survival

by Lenworth M. Jacobs, MD, MPH, FACS;
Karyl J. Burns, RN, PhD;
Norman McSwain, MD, FACS;
and Wayne Carver, MD

Whereas much attention has focused on the weapons used and the mental health of the shooter, other issues, including the provision of timely care to the victims, have been somewhat overlooked.

HIGHLIGHTS

- Defines mass casualty incidents due to firearms as a public health problem.
- Discusses the phases of mass-casualty events and the factors influencing injury.
- Describes aspects of mass-casualty firearm events that require careful examination, such as medical scene management and tactical emergency medical support.
- Authors suggest that TEMS teams be used more frequently to deliver emergency care at the scene of the shooting.
- Introduces readers to the Joint Committee to Create a National Policy to Enhance Survivability From Mass Casualty Shooting Events. The ACS played an active role in creating this committee and in the development of a report the panel has released.

Since 1996, more than 60 mass-casualty shootings have occurred in the U.S, and 18 have transpired in other countries.[1] As these statistics demonstrate, gun violence is a public health problem. As such, analysis and policymaking are required to reduce the suffering and burdens that are a direct result of these events. This article discusses several aspects of mass-casualty firearm events that require careful examination, such as medical scene management and tactical emergency medical support.

Initial response

Whereas much attention has focused on the weapons used and the mental health of the shooter, other issues, including the provision of timely care to the victims, have been somewhat overlooked. One aspect of mass-casualty firearm events that has been examined inadequately is the initial response and immediate management of the scene. A key feature of medical scene management is the immediate assessment, resuscitation, and transportation of the survivors to a trauma center. Enhanced methods of scene management and patient care are needed to improve survivability. The Haddon Matrix, a conceptual model of injury prevention, can guide the analyses and evaluations required to develop and implement policies and procedures to maximize survivability.[2,3]

The Haddon Matrix, which William Haddon, Jr., MD, developed in the mid-1960s, applies epidemiological principles to injury prevention.[2,3] Initially, it was a two-dimensional model of phases (pre-event, event, post-event) and factors related to injury, namely the interacting components that contribute to an injury, including the host, the agent or vehicle, the physical environment, and the social environment.[4]

Carol W. Runyan, PhD, proposed a third dimension in 1998 to direct decision making.[4] This third dimension accounts for psychosocial and economic aspects of injury that decision makers may use to select and implement the most appropriate strategies for injury prevention. The application of the Haddon Matrix presented in this article considers factors of the event phase of mass-casualty firearm situations and highlights the need for a decision-making process to implement strategies for increased survival.

Event-phase factors related to the agent of injury include the weapon, the shooter, the ability of law enforcement to neutralize the shooter, and the survivability of the victims. One area that needs more extensive consideration during the event phase is the ability of emergency medical services (EMS) personnel to expeditiously assess

The first priority needs to be assessment and care of the victims. As noted in the Prehospital Trauma Life Support program—patients are the most important people at the scene of an emergency.

and attend to survivors. Knowledge of the weapon and ammunition used and the type of injuries sustained may enhance their assessment.

Knowledge of the type of weapon and ammunition used in the shooting will help EMS to anticipate the nature and extent of injuries and to begin formulating a response. As with much of trauma, injury due to firearms is related to kinetic energy, or the force that is produced and strikes the victim. In addition, three characteristics of the frontal surface area of a bullet determine capacity to cause damage or cavitation: the profile, tumble, and fragmentation.[3] The profile refers to the bullet's ability to increase its size on impact, tumble pertains to the bullet's ability to change its angle once inside the body, and fragmentation describes its capacity to break into pieces. All three factors increase the lethality of the bullet. Victims shot with a single, low-energy bullet that does not change size on impact, does not tumble to increase its impact, and does not break into fragments are more likely to survive.[3]

Determining the anatomy of the injuries is another assessment that needs to occur rapidly. Direct injuries to the heart or central nervous system are rarely survivable. An analysis of the Sandy Hook Elementary School shootings in Newtown, CT, in December 2012, by two of this article's authors—Dr. Carver, Connecticut's Chief Medical Examiner, and Dr. Jacobs, the Chair of the State of Connecticut Committee on Trauma, who was deputized to participate in the review—revealed injuries in 26 victims that were immediately lethal. However, two women at the event sustained injury to an extremity and survived.[5] Survival from an extremity injury is not unusual. Injuries to the extremities or torso may be survivable if treated in time (minutes are critical at this stage), but may lead to hemorrhagic death if treatment is delayed.

Focus on the victims

Typically in mass-casualty shootings, law enforcement's initial focus is on the perpetrator. EMS is unable to attend to victims until the shooter has been neutralized or law enforcement has declared the site of the event to be safe. This situation may cause significant delay in treating survivable victims. Delay can lead to an increased killed-to-injury ratio in contrast with a lesser killed-to-injury ratio when expeditious assessment and care occur. Again, time is critical.

Greater attention to the needs of the victims is important. The scene is a medical emergency. Law enforcement personnel must focus simultaneously on the shooter and the patients. A safe environment for EMS to quickly assess patients and begin their treatment, resuscitation, and transportation for definitive care is critical. Documenting the event and gathering evidence can occur while patients are being treated. The first priority needs to be assessment and care of the victims. As noted in the Prehospital Trauma Life Support (PHTLS) program—patients are the most important people at the scene of an emergency.[3]

TEMS teams

Unfortunately, mass-casualty shooting may create scenes that remain unsafe for extended periods of time, increasing the likelihood that victims who are not immediately killed will die from a lack of medical care. In such cases, tactical emergency medical support (TEMS) should be called to the scene.[3] TEMS teams are specially trained and equipped to function within the perimeter of a danger zone. They support the special operations of law enforcement by carrying out such responsibilities as injury control, care under fire, special extraction, and tactical rescue. TEMS is designed to provide a system of care that supports the missions of law enforcement while maximizing victims' clinical outcomes and minimizing risk to caregivers. This kind of medical support incorporates the principles of military medicine, which include the tactical combat casualty care (TCCC) guidelines.[3] These guidelines provide battlefield medics and corpsmen with strategies for managing trauma in a tactical environment. They are the standard of care for military tactical medicine. The American College of Surgeons (ACS) Committee on Trauma and the National Association of Emergency

Unfortunately, the time has come when intentional civilian mass-casualty incidents require a military-like response. This approach will enhance rapid assessment, treatment, and triage of patients.

Medical Technicians have endorsed these guidelines through the PHTLS program.[3]

Although military and law enforcement operations are unique, the TCCC guidelines may be used to standardize TEMS protocols.[3] These principles are applicable to events that generate mass casualties where a team of responders is tasked to secure the scene and simultaneously access and treat multiple victims. The National Tactical Officers Association has endorsed TEMS and the TCCC guidelines.[3] All communities should have rapid access to TEMS, including tactical EMS personnel who are trained for the exigencies of mass-casualty shootings. To achieve the earliest possible care, personnel in schools and other public places should be trained not only in evasive and protective maneuvers but also in first aid for penetrating injuries to themselves and others.

Unfortunately, the time has come when intentional civilian mass-casualty incidents require a military-like response. This approach will enhance rapid assessment, treatment, and triage of patients. Mass-casualty shootings should be viewed as medical scenes where treating patients is a top priority. Although the concepts proposed here would not have saved the 26 Newtown victims, survivability of future mass-casualty shootings will be enhanced if EMS and law enforcement personnel adopt policies and procedures for rapid patient assessment, treatment, and transportation to definitive care.

ACS plays leadership role

The ACS has taken a leadership role in achieving the goal of an integrated response system to rapidly care for patients in these horrific events. Recently, the ACS brought together professionals to form the Joint Committee to Create a National Policy to Enhance Survivability From Mass Casualty Shooting Events. The committee had representation from the ACS Board of Regents, the ACS Committee on Trauma, the PHTLS Program, the Federal Bureau of Investigation, the Major Cities Chiefs Association, the EMS section of the International Association of Fire Chiefs, and the Committee on Tactical Combat Casualty Care. The joint committee met in Hartford, CT, on April 2 and produced a document titled "Improving Survival from Active Shooter Events: The Hartford Consensus," which is published in its entirety on the following pages. The organizations and agencies involved in the development of this document anticipate that it will be useful in promoting local, state, and national policies that will improve survival from mass-casualty shootings. ◆

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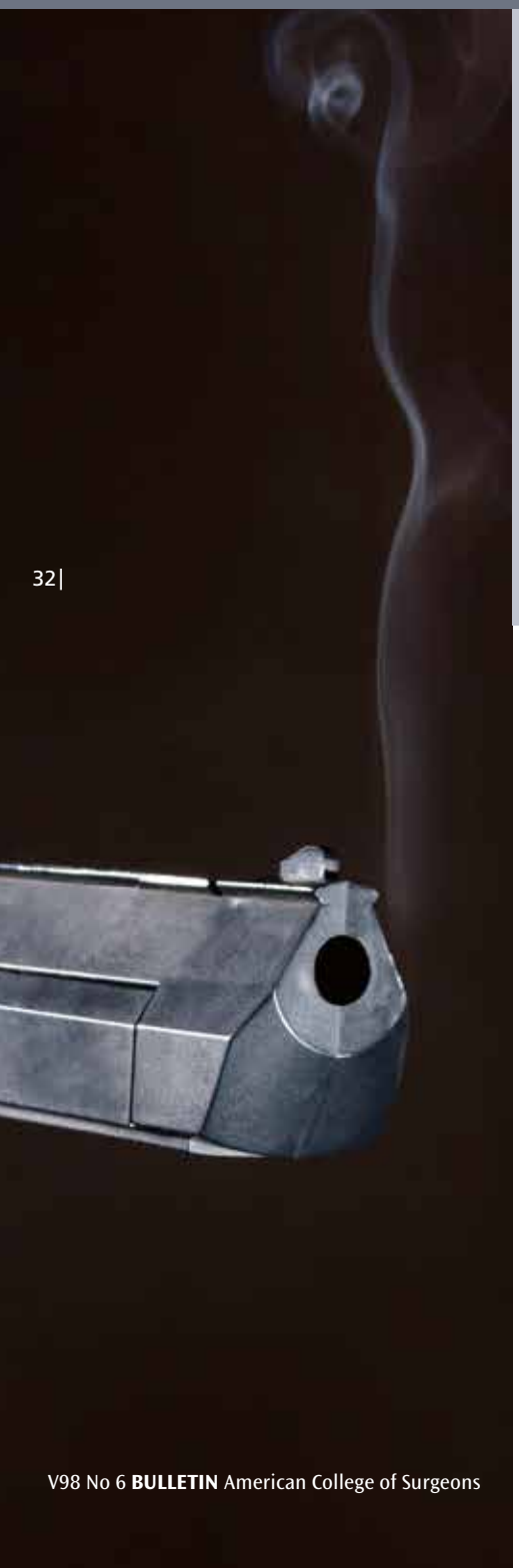
Improving Survival from Active Shooter Events:

The Hartford Consensus



Joint Committee to Create a National Policy to Enhance Survivability From Mass Casualty Shooting Events

Lenworth M. Jacobs, MD, MPH, FACS,
Hartford Hospital, American College of Surgeons (ACS) Board of Regents

Norman McSwain, MD, FACS,
Medical Director, Prehospital Trauma Life Support

Michael Rotondo, MD, FACS,
Chair, ACS Committee on Trauma

David S. Wade, MD, FACS
Chief Medical Officer, Federal Bureau of Investigation (FBI)

William P. Fabbri, MD, FACEP
Medical Director, Emergency Medical Support Program, FBI

Alexander Eastman, MD, MPH, FACS
Major Cities Chiefs Association (Lt. Dallas Police Department)

Frank K. Butler, MD,
Chairman, Committee on Tactical Combat Casualty Care

John Sinclair,
International Director and Immediate Past-Chair, International Association of Fire Chiefs-EMS Section (Fire Chief, Kittitas Valley Fire and Rescue)

Introduction

The recent mass casualty shooting events in America have had a profound effect on all segments of society. The medical, law enforcement, fire/rescue, and emergency medical services (EMS) communities have each felt the need to respond. It is important that these efforts occur in a coordinated manner to generate policies that will enhance survival of the victims of these events. Such policies must provide a synchronized multi-agency approach that is immediately available within the communities affected by such tragedies.

The American College of Surgeons (ACS) brought together senior leaders from all of the aforementioned disciplines to produce a document that will stimulate discussion and ultimately lead to strategies to improve survival for the victims. A day-long conference on April 2 in Hartford, CT, obtained input from medical, law enforcement, fire/rescue, EMS first responder, and military experts. The conference relied upon data and evidence from existing military and recent civilian experiences and was sensitive to the multiple agencies that play a role in responding to mass casualty shootings. The meeting, known as the Hartford Consensus Conference, produced this concept paper titled Improving Survival from Active Shooter Events. The purpose of this document is to promote local, state, and national policies to improve survival in these uncommon but horrific events. This short statement

Published with permission of the Chair of the Hartford Consensus, Lenworth M. Jacobs, MD, MPH, FACS.

The purpose of this document is to promote local, state, and national policies to improve survival in these uncommon but horrific events.

describes methods to minimize loss of life in these terrible incidents.

Statement of the problem

Active shooter/mass casualty events are a reality in modern American life. As our experience with these events has accumulated, it has become clear that long-standing practices of law enforcement, fire/rescue, and EMS responses are not optimally aligned to maximize victim survival. Using existing tactics and evolving trauma concepts, the means of improving survival already exist, but have been underutilized. Now is the time to apply these lessons to active shooter events. While efforts to isolate or stop the active shooter remain paramount, early hemorrhage control is critical to improving survival.

Early hemorrhage control to improve survival

The response to shooting events has historically involved a segmented, sequential public safety operation first focused on law enforcement goals (stop the shooting), followed by the remainder of the incident, which is typically focused on response and recovery. As we go forward, initial actions to control hemorrhage should be part of the law enforcement response, and knowledge of hemorrhage control needs to be a core law enforcement skill. Maximizing survival requires an updated and integrated system that can achieve multiple objectives simultaneously.

Life-threatening injuries in active shooter incidents such as those in Fort Hood, Tucson, and Aurora are similar to those encountered in combat settings. Military experience has shown that the number one cause of preventable death in victims of penetrating trauma is hemorrhage. Tactical Combat Casualty Care (TCCC) programs, when implemented with strong leadership support, have produced dramatic reductions in preventable death. Recognizing that active shooter incidents can occur in any community, the Hartford Consensus encourages the use of existing emergency medical techniques and equipment, validated by over a decade of well-documented clinical evidence.

The Hartford Consensus recommends that an integrated active shooter response should include the critical actions contained in the acronym THREAT:

- **T**hreat suppression
- **H**emorrhage control
- **R**apid **E**xtrication to safety
- **A**ssessment by medical providers
- **T**ransport to definitive care

While some may view the addition of hemorrhage control skills as yet another training requirement in times of constrained financial resources, the concepts are simple, proven, and relatively inexpensive; many law enforcement agencies have already adopted them as best practices. Life-threatening bleeding from extremity wounds is best controlled initially through use of tourniquets, while internal bleeding resulting from penetrating wounds to the chest and trunk is best addressed through expeditious transport to a hospital setting. Optimal response to the active shooter includes identifying and teaching skill sets appropriate to each level of responder without regard to law enforcement or fire/rescue/EMS affili-

Members of the joint committee working group, left to right: Drs. Butler, McSwain, Eastman, Fabbri, Jacobs, Wade, and Burns.

The Joint Committee to Create a National Policy to Enhance Survivability From Mass Casualty Shooting Events. Left to right: Drs. Eastman, Butler, McSwain, Wade, Burns, Jacobs, and Fabbri.

ation. THREAT incorporates the proven concepts of self-care and buddy-care.

Integrated response

Care of the victims is a shared responsibility between law enforcement, fire/rescue, and EMS. Optimal outcomes depend on communication between public safety responders. The response to an active shooter event is a continuum that requires coordination between law enforcement and the medical/evacuation providers. Such coordination includes:

- Shared definitions of terms used in mass shooting events
- Jointly developed local protocols for responding to active shooter events
- Inclusion of active shooter events in tabletop and field exercises to improve familiarity with jointly developed protocols

Conclusion

The Hartford Consensus seeks to improve survival from active shooter events. The use of THREAT and a more integrated response by law enforcement, fire/rescue, and EMS offers communities a mechanism to minimize loss of life in these incidents. ◆

Active Shooter and Intentional Mass-Casualty Events:

The Hartford Consensus II

Joint Committee to Create a National Policy to Enhance Survivability From Mass-Casualty Shooting Events

Lenworth M. Jacobs, MD, MPH, FACS,
Vice-president, academic affairs, Hartford Hospital; ACS Board of Regents

Michael Rotondo, MD, FACS,
Chair, ACS Committee on Trauma

Norman McSwain, MD, FACS,
Medical Director, PreHospital Trauma Life Support

David S. Wade, MD, FACS,
Chief Medical Officer, Federal Bureau of Investigation (FBI)

William P. Fabbri, MD, FACEP,
Medical Director FBI Emergency Medical Support Program

Alexander Eastman, MD, MPH, FACS,
Major Cities Chiefs Association

Frank K. Butler, MD,
Chairman, Committee on Tactical Combat Casualty Care (Department of Defense, Joint Trauma System)

John Sinclair,
Past-director, International Association of Fire Chiefs

Karyl Burns, RN, PhD,
Research scientist, Hartford Hospital

Kathryn Brinsfield, MD,
National Security Staff, Executive Office of the President

Richard Carmona, MD, FACS,
17th U.S. Surgeon General

Richard Serino,
Deputy Administrator, Federal Emergency Management Agency

Alasdair Conn, MD, FACS,
Chief of emergency services, Massachusetts General Hospital

Richard Kamin, MD, FACEP
EMS Program Director, state of Connecticut, American College of Emergency Physicians Emergency Casualty Care Committee

Editor's note: The Joint Committee to Create a National Policy to Enhance Survivability From Mass-Casualty Shooting Events issued the following call to action on July 11, 2013. It is the second report from the committee, which the American College of Surgeons (ACS) played a leadership role in forming. The committee has representation from the ACS Board of Regents, the ACS Committee on Trauma, the PreHospital Trauma Life Support program, the Federal Bureau of Investigation, the Major Cities Chiefs Association, the emergency medical services (EMS) section of International Association of Fire Chiefs, and the Committee on Tactical Combat Casualty Care. The group's first report was published in the June issue of the *Bulletin*.* Both consensus documents are published with the permission of the Chair of the Hartford Consensus, ACS Regent Lenworth M. Jacobs, MD, MPH, FACS.

*Joint Committee to Create a National Policy to Enhance Survivability From Mass-Casualty Shooting Events. Improving Survival from Active Shooter Events: The Hartford Consensus. *Bull Am Coll Surg.* 2013;98(6):14-16.

Preventable death after an active shooter or an intentional mass-casualty event should be eliminated through the use of a seamless, integrated response system.

Concept to action

On April 2, representatives from a select group of public safety organizations including law enforcement, fire, pre-hospital care, trauma care, and the military convened in Hartford, CT, to develop consensus regarding strategies to increase survivability in mass-casualty shootings. A concept document resulted and became known as the Hartford Consensus. It includes an acronym to describe the needed response to active shooter and intentional mass-casualty events. The acronym is THREAT:

- **T**hreat suppression
- **H**emorrhage control
- **R**apid **E**xtrication to safety
- **A**ssessment by medical providers
- **T**ransport to definitive care

Within the framework of THREAT, there exists the opportunity to improve survival outcomes for the victims of active shooter and intentional mass-casualty events through mutual collaboration and reinforcing responses. The Hartford Consensus stipulates that medical training for external hemorrhage control techniques is essential for all law enforcement officers. They should play a key role as the bridge between the law enforcement phase of the operation and the integrated rescue response. The interval from wounding to effective hemorrhage control can be minimized by law enforcement officers trained in hemorrhage control. This principle is central to the findings of the first Hartford Consensus. The purpose of the Hartford Consensus Conference II, which took place July 11 in Hartford, was to develop strategies for focused actions to achieve the objectives of the first Hartford Consensus.

Fundamental concepts

To maximize survival from an active shooter or an intentional mass-casualty event there must be a continuum of care from the initial response to definitive care. The essence of this continuum involves the seamless integration of hemorrhage control interventions. This process starts with the actions of the uninjured public or minimally injured victims and extends to the first responding law enforcement officers, then to EMS/fire/rescue personnel, and ultimately to definitive trauma care. These concepts must be scalable to facilitate implementation in communities of all sizes. The law enforcement response has evolved from the original concepts of "surround and contain" to a more modern and aggressive response. EMS/fire/rescue must be involved earlier in the care of these victims. They should have direct contact with the law enforcement personnel on the scene.

Call to action

No one should die from uncontrolled bleeding. Preventable death after an active shooter or an intentional mass-casualty event should be eliminated through the use of a seamless, integrated response system. Each group in the following categories should perform the actions necessary to accomplish this goal:

Public: Uninjured or minimally injured victims can act as rescuers. Everyone can save a life.

- Recognize that the initial response to an intentional mass-casualty event will be from uninjured bystanders and minimally injured victims
- Design education programs and implement training for a public response to an active shooter or intentional mass-casualty event
- Pre-position necessary equipment in appropriate locations
- Recognize that in an active shooter event the education message should include the concept of "Run, Hide, Fight"

Law enforcement: External hemorrhage control is a core law enforcement skill.

- Identify appropriate external hemorrhage control training for law enforcement officers

Hartford Consensus II attendees, from left: Drs. Brinsfield, Fabbri, Wade, Jacobs, Serino, Carmona, Conn, Kamin, Eastman, Burns, McSwain, and Rotondo. Not pictured (joined by phone): Dr. Butler and Mr. Sinclair.

- Ensure appropriate equipment, such as tourniquets and hemostatic dressings, is available to every law enforcement officer

- Ensure assessment and triage of victims with possible internal hemorrhage for immediate evacuation to a dedicated trauma hospital

- Train all law enforcement officers to assist EMS/fire/rescue in the evacuation of the injured

EMS/fire/rescue: The response must be more fully integrated and traditional role limitations revised.

- Train to increase awareness and operational knowledge about the initial response to an active shooter or intentional mass-casualty event
  - It is no longer acceptable to stage and wait for casualties to be brought out to the perimeter.
  - Training must include hemorrhage control techniques, including the use of tourniquets, pressure dressings, and hemostatic agents.
  - Training must include assessment, triage, and transport of victims with potentially lethal internal hemorrhage and torso trauma to definitive trauma care.

- Incorporate Tactical Combat Casualty Care and Tactical Emergency Casualty Care concepts into EMS/fire/rescue training

- Modify the response doctrine to improve the interface between EMS/fire/rescue and law enforcement in order to optimize patient care

- Establish a common language for responders, permitting each community to improve coordination, develop concurrent response, and establish mutually acceptable levels of operational risk between all public safety professionals to enhance the defense, rescue, treatment, extrication, and definitive care of survivors

Definitive trauma care: Existing trauma systems should be used to optimize seamless care.

- Provide trauma care to victims of an active shooter or an intentional mass-casualty event based on available resources and the establishment of mitigation strategies that acknowledge community limitations

- Design, implement, and practice plans to handle a surge in patient care demand from an active shooter or an intentional mass-casualty event

Education

To achieve the goals of this call for action, education of all groups is required. The core Hartford Consensus concepts should not be limited to traditional public safety responders. Everyone can and should be an initial responder. Education should be tailored to the level of the responder. Everyone should be taught hemorrhage control. Professional first responders should also be taught airway management. Education for the patient care process should focus on THREAT and include:

- Rapid access to hemorrhage control
  - External hemorrhage control
    - Direct pressure
    - Tourniquet application
    - Hemostatic agents

To achieve the goals of this call for action, education of all groups is required.

- Internal hemorrhage control
  - Rapid transportation and access to a trauma center
  - Prompt access to the operating room
  - Incorporation of new concepts in hemostatic resuscitation and damage control surgery that have been used successfully in recent military conflicts

Evaluation

With this significant change in approach to an active shooter or an intentional mass-casualty event, a carefully conceived evaluative process to determine the efficacy of THREAT is warranted. Scientific evaluation of the implementation of Hartford Consensus concepts must ensure that future efforts are focused on ideas that are effective.

The evaluation process should include measurement of the following:

- Accessibility of field hemorrhage control equipment for law enforcement, EMS/fire/rescue, and the general public
- Documentation of the use of hemorrhage control equipment by law enforcement, EMS/fire/rescue, and the general public
- Submission of relevant data to a national registry
- Analysis of the quantitative and qualitative aspects of the data submission process to a national registry
- Use of THREAT training guidelines by all relevant providers
- Integration of operational doctrine through policy development and enabling legislation across the country relevant to law enforcement, EMS/fire/rescue
- Compliance and efficacy of the after action report process
- Effectiveness of THREAT education
  - Effectiveness of THREAT implementation
  - Effectiveness of threat suppression
  - Timelines and appropriateness of initial hemorrhage control
  - Timeliness and effectiveness of rapid extrication
  - Transportation to and interface with definitive care facilities
  - Readiness of definitive care facilities for control of internal hemorrhage
- Reduction of preventable death
- Local, regional, and national performance to identify opportunities for improvement and gaps in funding for research and development

Coalition of stakeholders

To achieve the goals of this call to action, a coalition of stakeholders must be established. To do so, the following must be accomplished:

- Identify core national leaders
- Establish a communication plan for the widespread dissemination of THREAT

The Hartford Consensus II has generated a call to action in order to enhance survival from active shooter or intentional mass-casualty events.

HARTFORD CONSENSUS POTENTIAL PARTNER ORGANIZATIONS FOR MASS-CASUALTY EVENTS

American College of Surgeons

American College of Emergency Physicians

American Trauma Society

American Red Cross

U.S. Department of Defense Joint Trauma System

U.S. Department of Defense Committee on Tactical Combat Casualty Care

Committee for Tactical Emergency Combat Casualty Care

Federal Bureau of Investigation

U.S. Fire Administration

National Highway Traffic Safety Administration Office of Emergency Medical Services

U. S. Department of Homeland Security Office of Health Affairs

U.S. Department of Homeland Security Federal Emergency Management Agency

International Association of Fire Chiefs

International Association of Firefighters

International Association of Chiefs of Police

International Association of EMS Chiefs

National Volunteer Fire Council

National Emergency Medical Service Advisory Committee

National Association of State Emergency Medical Services Officials

National Association of Emergency Medical Services Physicians

National Association of Emergency Medical Technicians

National Association of EMS Educators

National Tactical Officers Association

National Sheriffs' Association

American Association for the Surgery of Trauma

Eastern Association for the Surgery of Trauma

PreHospital Trauma Life Support

Emergency Nurses Association

Society of Trauma Nurses

University law enforcement and health care organizations

Hospital accreditation organizations

Automobile manufacturers

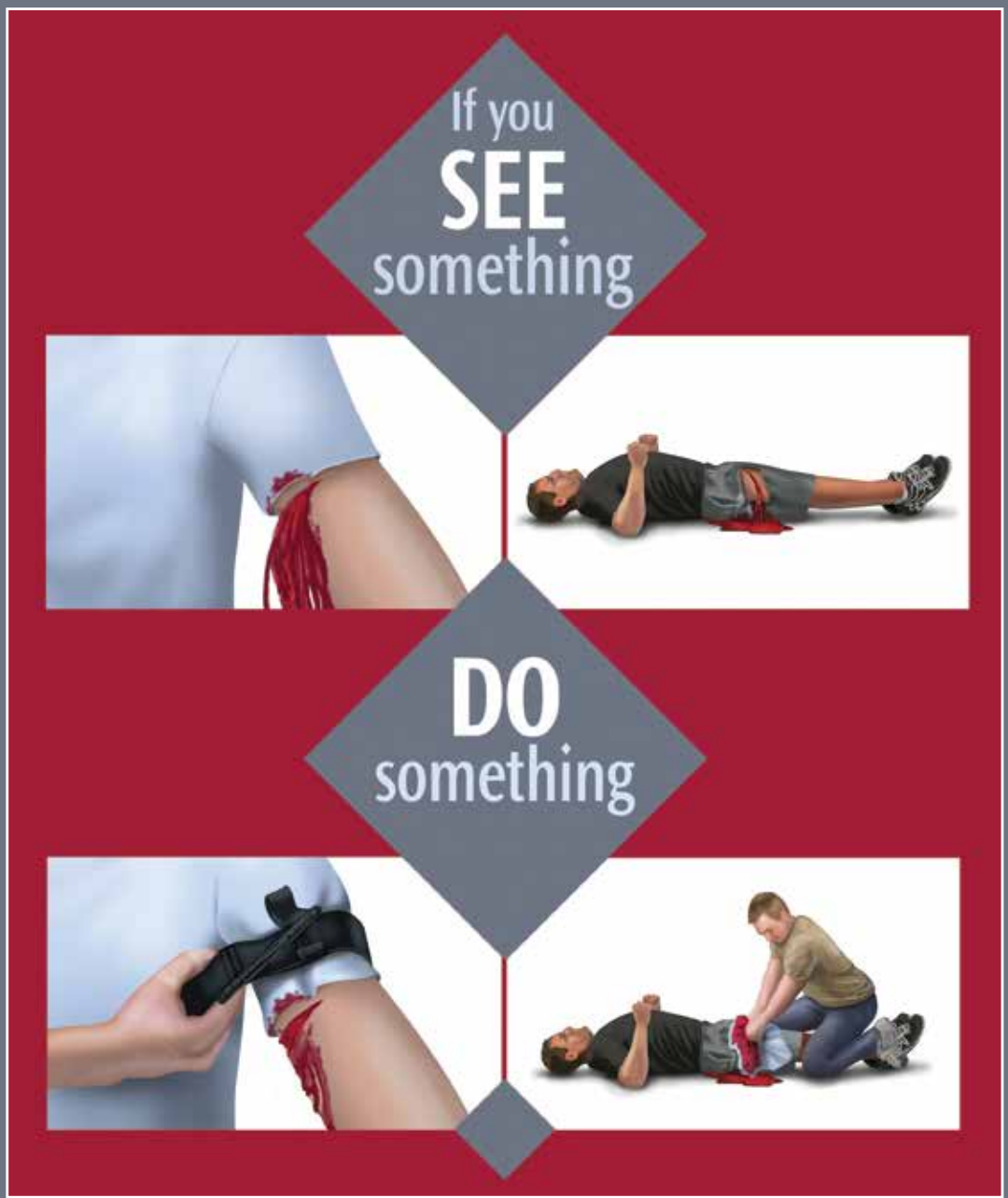
Faith-based organizations

- Identify legislative priorities
- Engage in the legislative process at the national and state levels
- Engage in funding initiatives
- Implement pilot projects to demonstrate the effectiveness of the action principles of the Hartford Consensus
- Partner with relevant groups including national, federal, state, law enforcement, fire, EMS, medical, nursing, military, professional, and voluntary organizations (see sidebar, this page)

Conclusion

The Hartford Consensus II has generated a call to action in order to enhance survival from active shooter or intentional mass-casualty events. The call to action engages the public, law enforcement, EMS/fire/rescue, and definitive care facilities. It embodies the principles of THREAT and calls for modification of the initial responses to these events. A broad educational strategy and a robust evaluation of the implementation of THREAT are needed to quantify the benefits of this approach to the management of active shooter and mass-casualty events. ◆

The Hartford Consensus III: Implementation of Bleeding Control



by Lenworth M. Jacobs, Jr., MD, MPH, FACS,

and the Joint Committee to Create a National Policy to Enhance Survivability from Intentional Mass-Casualty and Active Shooter Events

Recent events have shown that, despite the lessons learned from more than 6,800 U.S. combat fatalities over the last 13 years, opportunities exist to improve the control of external hemorrhage in the civilian sector.

Editor's note: The Joint Committee to Create a National Policy to Enhance Survivability from Intentional Mass-Casualty and Active Shooter Events developed the following call to action at its April 14 meeting in Hartford, CT. This committee meeting, chaired by American College of Surgeons (ACS) Regent Lenworth M. Jacobs, Jr., MD, MPH, FACS, focused on implementation of strategies for effective hemorrhage control. The deliberations of the group yielded the Hartford Consensus III document. This report was presented at a White House roundtable forum on April 29, which included representatives from 35 medical and surgical, nursing, law enforcement, fire, emergency medical services (EMS), and other stakeholder organizations (see pages 22 and 24 for lists of participating organizations and agencies). The participants unanimously endorsed the principles set forth in the Hartford Consensus III. The following is the Hartford Consensus III, edited to conform with *Bulletin* style.

Our nation's threat from intentional mass-casualty events remains elevated. Enhancing public resilience to all such potential hazards has been identified as a priority for domestic preparedness. Recent events have shown that, despite the lessons learned from more than 6,800 U.S. combat fatalities over the last 13 years, opportunities exist to improve the control of external hemorrhage in the civilian sector.* These opportunities exist in the form of interventions that should be performed by bystanders known as immediate responders and professional first responders, such as law enforcement officers, emergency medical technicians (EMTs), paramedics, and firefighters (EMS/fire/rescue), at the scene of the incident.

The Joint Committee to Create a National Policy to Enhance Survivability from Intentional Mass-Casualty and Active Shooter Events was founded by the ACS. The committee met twice in 2013, making specific recommendations and issuing a call to action. The deliberations of the committee have become known as the Hartford Consensus. A third meeting was convened on April 14. This Hartford Consensus III meeting focused on implementation strategies for effective hemorrhage control.

The overarching principle of the Hartford Consensus is that in intentional mass-casualty and active shooter events, no one should die from uncontrolled bleeding. An acronym to summarize the necessary response is THREAT:

- **T**hreat suppression
- **H**emorrhage control
- **R**apid **E**xtrication to safety
- **A**ssessment by medical providers
- **T**ransport to definitive care

The Hartford Consensus calls for a seamless, integrated response system that includes the public, law enforcement, EMS/fire/rescue, and definitive care to employ the THREAT response in a comprehensive and expeditious manner.

Three levels of responders

There are different levels of responders in an intentional mass-casualty or active shooter event:

- Immediate responders: The individuals who are present at the scene who can immediately control bleeding with their hands and equipment that may be available
- Professional first responders: Prehospital responders at the scene who have the appropriate equipment and training
- Trauma professionals: Health care professionals in hospitals with all of the necessary equipment and skill to provide definitive care

Immediate responders

One goal of the Hartford Consensus III is to empower the public to provide emergency care. During intentional mass-casualty events, those present at the point

continued on page after next

*Holcomb JB, Hoyt DB. Comprehensive injury research. *JAMA*. 2015; 313(14):1463-1464.

THE HARTFORD CONSENSUS III: IMPLEMENTATION OF BLEEDING CONTROL

JOINT COMMITTEE TO CREATE A NATIONAL POLICY TO ENHANCE SURVIVABILITY FROM INTENTIONAL MASS-CASUALTY AND ACTIVE SHOOTER EVENTS

PARTICIPANTS

Lenworth M. Jacobs, Jr., MD, MPH, FACS
Chairman, Hartford Consensus
Vice-President, Academic Affairs
Hartford Hospital
Board of Regents,
American College of Surgeons

Richard Carmona, MD, MPH, FACS
17th U.S. Surgeon General

Norman McSwain, MD, FACS
Medical Director, Prehospital Trauma Life Support
Tulane University

Frank Butler, MD, FAAO, FUHM
Chairman, Committee on Tactical Combat Casualty Care
Department of Defense
Joint Trauma Systems

Doug Elliot
President, The Hartford
Chair, Board of Directors
Hartford Hospital

Andrew L. Warshaw, MD, FACS, FRCSEd(Hon)
President, American College of Surgeons
Massachusetts General Hospital, Boston

Jonathan Woodson, MD, FACS
Assistant Secretary of Defense for Health Affairs, Department of Defense

Richard C. Hunt, MD, FACEP
Director for Medical Preparedness Policy, National Security Council Staff
The White House

Ernest Mitchell
Administrator, U.S. Fire Administration
Federal Emergency Management Agency
Department of Homeland Security

Alexander Eastman, MD, MPH, FACS
Major Cities Police Chiefs Association
Chief of Trauma, Parkland Memorial Hospital
University of Texas Southwestern Medical Center

Kathryn Brinsfield, MD, MPH, FACEP
Assistant Secretary, Health Affairs
Chief Medical Officer,
Department of Homeland Security

Colonel Kevin O'Connor, DO, FAAFP
Physician to the Vice-President
The White House

William Fabbri, MD, FACEP
Director, Emergency Medical Services
Federal Bureau of Investigation

Richard Serino
Distinguished Visiting Fellow,
Harvard University, School of Public Health
8th Deputy Administrator,
Federal Emergency Management Agency

Alasdair Conn, MD
Chief Emeritus, Emergency Medicine
Massachusetts General Hospital

Karyl Burns, PhD
Research Scientist, Hartford Hospital

Matthew Levy, DO, MSc, FACEP
Johns Hopkins University
Senior Medical Officer,
Johns Hopkins Center for Law Enforcement Medicine

Leonard Weireter, MD, FACS
Vice-Chair, Committee on Trauma
American College of Surgeons
Eastern Virginia Medical School

John Holcomb, MD, FACS
Chief, Division of Acute Care Surgery
University of Texas Health Science Center

Peter Rhee, MD, MPH, FACS
Department of Surgery
University of Arizona

Ronald Stewart, MD, FACS
Chair, Committee on Trauma
American College of Surgeons
The University of Texas Health Science Center at San Antonio

Robert Anderson, CDR, MSC, USN
Military Assistant to the Assistant Secretary of Defense for Health Affairs
Department of Defense

Thomas M. Scalea, MD, FACS
Physician-in-Chief,
R Adams Cowley Shock Trauma Center
University of Maryland
School of Medicine

Donald Jenkins, MD, FACS
Medical Director, Trauma Center
Mayo Clinic

David R. King, MD, FACS
Trauma, Emergency Surgery and Surgical Critical Care
Department of Surgery
Massachusetts General Hospital

Hartford Consensus III participants. Seated, left to right: Drs. McSwain, Warshaw, Jacobs, Woodson, Brinsfield, and Levy; and Mr. Elliott. Standing left to right: Dr. Rhee, Mr. Mitchell, Drs. Eastman, Conn, O'Connor, Stewart, Butler, Burns, Weireter, Hunt, Holcomb, and Fabbri; and Commander Anderson.

of wounding have often proven invaluable in responding to the initial hemorrhage control needs of the wounded. Traditionally thought of as "bystanders," these immediate responders should not be considered passive observers and can provide effective lifesaving first-line treatment.

Immediate responders contribute to a victim's survival by performing critical external hemorrhage control at the point of wounding and prior to the arrival of traditional first responders. Immediate responders contribute to what is the critical step in eliminating preventable prehospital death: the control of external hemorrhage.

The Hartford Consensus III recognizes the vital role that immediate responders play in responding to mass-casualty events. They make major contributions to improving survival from these incidents. However, the Hartford Consensus III does not advocate that members of the public enter areas of direct threat or imminent danger.

Good Samaritan laws have been effective in empowering the public to become involved in the immediate response to a victim of cardiac arrest or choking by the initiation of cardiopulmonary resuscitation and the Heimlich maneuver, respectively. The Hartford Consensus recommends that these legal protections be extended to include the provision of bleeding control.

Professional first responders

Professional first responders include law enforcement and EMS/fire/rescue. As indicated by THREAT, law enforcement must suppress the source of wounding if the shooter is still active and then, because they are usually the initial first responders on the scene, must act to control external hemorrhage. Victims with life-threatening external bleeding must be treated immediately at the point of wounding. All responders should be educated and have the necessary equipment to provide effective external hemorrhage control. Continued emphasis must be on the integration of the immediate responders, law enforcement, and EMS/fire/rescue to optimize rapid patient assessment, treatment, and transport to definitive care at the nearest appropriate hospital.

Building educational capabilities

Education in hemorrhage control can take many forms and should be offered using various modalities. Established education programs for individuals, communities, and professional responders can be modified to include effective external hemorrhage control techniques. The Bleeding Control for the Injured (B-Con) course offered by the National Association of Emergency Medical Technicians is an example of a newly created program that is appropriate for training individuals who have little or no medical background. Other methods such as public service announcements, slogans, advertising, and entertainment media should be used to convey the message that bleeding control is a responsibility of the public and is within their capabilities.

The public needs to be empowered to engage in lifesaving actions. This training should be included as part of preparing for situations involving other

APRIL 29, 2015

ROUNDTABLE ON BYSTANDERS: OUR NATION'S IMMEDIATE RESPONDERS

PARTICIPANTS

- Air Medical Physician Association
- American Academy of Physician Assistants
- American Ambulance Association
- American Association of Critical Care Nurses
- American Association for the Surgery of Trauma
- American College of Emergency Physicians
- American College of Surgeons
- American Heart Association
- American Hospital Association
- American Nurses Association
- American Osteopathic Association
- American Physical Therapy Association
- American Public Health Association
- American Trauma Society
- Association of Air Medical Services
- Association of State and Territorial Health Officials
- Eastern Association for the Surgery of Trauma
- Emergency Nurses Association
- Emergency Medical Services Labor Alliance
- International Academies of Emergency Dispatch
- International Association of Chiefs of Police
- International Association of Emergency Managers
- International Association of Emergency Medical Services Chiefs
- International Association of Firefighters
- International Association of Fire Chiefs
- Major Cities Chiefs Association
- National Association of Emergency Medical Technicians
- National Association of School Nurses
- National Association of State EMS Officials
- National Athletic Trainers Association
- National Emergency Management Association
- National Volunteer Fire Council
- Society of Emergency Medicine Physician Assistants
- Society of Trauma Nurses
- Trauma Center Association of America
- White House personnel
- Interagency Bystander Workgroup team leaders
- Federal invitees

potential hazards, including everyday events that may produce trauma and hemorrhage. For professional first responders, more advanced courses may offer additional options to control life-threatening external hemorrhage. All formal training should have specific objectives and train to competency. For professional responders, the training must be efficient and cost-effective. Ultimately, integrated training exercises must be conducted that include all levels of responders.

Specific educational content for immediate responders should include:

- Actions to ensure personal safety
- Appropriate interactions with law enforcement, EMS/fire/rescue, and medical personnel
- How to identify bleeding as a threat to life
- Use of hands to apply direct pressure
- Proper use of safe and effective hemostatic dressings
- Proper use of effective tourniquets
- Use of improvised tourniquets as a last resort

For professional first responders, educational content should include:

- Actions to ensure personal safety
- Coordination and integration of all responders
- Communication among all responders
- Appropriate interactions with immediate responders
- Application of THREAT principles
- Proper use of direct pressure
- Proper use of safe and effective hemostatic dressings
- Proper use of effective tourniquets

It is appropriate to use existing national organizations to widely disseminate the principles embodied in these education initiatives.

JAMES BROOKS HART, CMI

JAMES BROOKS HART, CMI

One-handed tourniquet application

Building equipment capabilities

Immediate responders need to recognize that applying pressure to a bleeding vessel is the appropriate first action to take and that their hands are a first-line resource. In most cases, control of external hemorrhage can be accomplished by applying direct pressure on the bleeding vessel.

Hemostatic dressings and tourniquets may be needed to effectively stop bleeding. For this reason, the Hartford Consensus recommends that all police officers and any concerned citizens carry a hemostatic dressing, a tourniquet, and gloves. This guideline should also apply to all EMS/fire/rescue personnel. Ground and air medical transport vehicles should carry multiple dressings and tourniquets based upon local need. In addition, bleeding control bags should be accessible in public places as determined by a local needs assessment. Potential sites for bleeding control bags include shopping malls, museums, hospitals, schools, theaters, sports venues, transportation centers (such as airports, bus depots, and train stations), and facilities with limited or delayed access. All hemostatic dressings and tourniquets must be clinically effective as documented by valid scientific data. The Tactical Combat Casualty Care guidelines for the U.S. military contain objective evidence to support the safety and efficacy of the various options for tourniquets and hemostatic dressings.

Contents of the bleeding control bags should include the following:

- Pressure bandages
- Safe and effective hemostatic dressings
- Effective tourniquets
- Personal protective gloves

Placement of bleeding control bags should be as follows:

- Next to all automatic external defibrillators based on local need
- Immediately recognizable visually or via a Web application
- Secure but accessible locations
- Able to be used within three minutes

Building resources for bleeding control programs

Procurement of equipment and training for bleeding control requires action at the federal, state, and local levels, as well as in the private sector. Tourniquet and hemostatic dressing procurement should reflect either the evidence and experience that the U.S. military has gained in the last 13 years of war or scientific evidence that becomes available. Federal agencies should make elimination of preventable death from hemorrhage a priority issue that will influence funding. At the

Immediate responder hemorrhage control

state and local levels, government should interact with the private sector to identify potential risks at public venues and workplaces. It is also important to note that municipalities can engage in fundraising activities at the local level to procure equipment. Professional organizations should set standards that encourage education, equipment, and training for immediate responders, which should be offered as a measure of public safety. Volunteers can be a resource to provide the training.

Considerations for the development and sustainability of bleeding control programs include the following:

- Using clear and concise messaging that bleeding control is an issue for public and private sectors
- Engaging the private sector, including businesses and trade associations
- Appealing to philanthropic organizations
- Applying for grant funding from government and private agencies
- Involving professional, community, social, and faith-based organizations

Conclusion

The most significant preventable cause of death in the prehospital environment is external hemorrhage. As demonstrated by guidelines enacted by the military, widespread bleeding control is critical to saving lives. Our nation has a history of learning hard lessons from wartime experiences; the case for hemorrhage control is no different. The Hartford Consensus directs that all responders have the education and necessary equipment for hemorrhage control and strongly endorses civilian bystanders to act as immediate responders. Immediate responders represent a foundational element of the ability of the U.S. to respond to these events and are a critical component of our ability to build national resilience. Immediate responders must be empowered to act, to intervene, and to assist.

We are a nation of people who respond to others in need. It is no longer sufficient to "see something, say something." Immediate responders must now "see something, do something." ♦

Author's note

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The continuing threat of intentional mass casualty events in the U.S.: Observations of federal law enforcement

by William P. Fabbri, MD, FACEP
Director, Operational Medicine
Federal Bureau of Investigation

The mission of the Hartford Consensus is to develop basic principles to improve victim survival by promoting more effective local responses to active shooter incidents. From the inception of this project following the 2012 Sandy Hook Elementary School tragedy, physicians from the Federal Bureau of Investigation (FBI) have worked with the American College of Surgeons Committee on Trauma in applying what is known about these incidents to the guidance developed by the consensus group.

At the initial meeting in 2013, the Hartford Consensus participants collectively observed that the elements of a more effective response to these events already exist in many communities. These components fall within the responsibilities of law enforcement, emergency medical services, and rescue services, as well as the emergency and surgical services of receiving hospitals. To be effective, these elements of the response must be organized, coordinated, and deployed through plans compatible with the resources currently available in a given community.

The capabilities of local public safety agencies, along with the organizational philosophies and risk tolerance of these agencies, vary across the country. Hospital capabilities also vary widely with respect to the ability to receive multiple simultaneous trauma cases, a particularly challenging problem in rural locations. In spite of these challenges, what we know about active shooter incidents tells us that these violent acts occur in communities of all sizes throughout the country and appear to be increasing in frequency. This history supports the need for emergency action planning in every community. No single approach to improving survival in active shooter incidents is universally applicable; however, common principles apply to response in any community.

Although these incidents have been well publicized for almost a half century, the 1999 Columbine High School incident was a sentinel event resulting in major changes in police response to hostage situations involving armed perpetrators.[1,2] Many departments have adopted a model of rapid, dynamic engagement of active shooters as a lesson learned from Columbine. This approach by police, intended to minimize the number of victims by bringing the incident to a more rapid conclusion, alters the problems faced by the trauma care system that will receive casualties from the incident and has implications for both emergency medical services and receiving hospitals. In addition to ending the incident more quickly, this approach provides earlier access to victims requiring emergency hemorrhage control. The survival of this subset of victims presents challenges to all participants in the response system, from point of injury to definitive care in the surgical suite. The Hartford Consensus views hemorrhage control as second only to engaging and defeating the shooter and as key to improving the survival of victims of active shooter incidents.

The Hartford Consensus recommends that police departments train and equip their officers to perform initial hemorrhage control measures using hemostatic dressings and tourniquets. It also urges emergency medical and rescue services to train and equip their personnel to work more closely with the police in terms of both time and distance. The overarching result envisioned is fewer injuries because of rapid termination of the active shooter threat, followed by rapid control of externally compressible hemorrhage by police and emergency medical and rescue services, with expedited identification and evacuation to surgical intervention of victims with suspected internal hemorrhage.

The law enforcement community has made substantial gains in training and equipping officers to rapidly engage the active shooter threat and provide emergency hemorrhage control when the threat is terminated. As part of a presidential directive

These violent acts occur in communities of all sizes throughout the country and appear to be increasing in frequency.

following the Sandy Hook Elementary School incident,[3] the Department of Justice sponsored an initiative based on standardized officer training for active shooter incident response.[4,5] This program has provided training for approximately 50,000 officers nationally, across all jurisdictions and without cost to their departments. The program is expected to reach a total of 80,000 officers within the next 18 months. Since March 2013, the FBI has hosted response workshops for more than 64,000 police commanders from more than 4,000 agencies.[6] The FBI's 56 field offices hosted active shooter workshops for more than 1,800 police agencies. More than 1,000 leaders of public safety agencies at all levels of government attended tabletop exercises in active shooter response. Within the FBI itself, first aid training emphasizing hemorrhage control has been extended to all 13,000 special agents. Similar programs by police organizations, such as the Major Cities Chiefs Police Association and others, have reached many tens of thousands more officers.[7]

The initiatives taken by the law enforcement community have encouraged similar work in the emergency medical and fire rescue services. In September 2013, following collaboration with leaders of public safety agencies and professional organizations, the U.S. Fire Administration released detailed operational guidance for local development of fire service and emergency medical and rescue services active shooter response plans.[8] Following the Boston Marathon bombing in April 2013, this project expanded its scope to include similar contingencies.

In addition, the Department of Homeland Security sponsored collaboration by authorities in medicine, law enforcement, fire/rescue, and emergency medical services at all levels of government with specialists in the private and public sectors to develop consensus guidance for communities developing active shooter and mass casualty event plans. The Department of Homeland Security's Office of Health Affairs assembled more than 250 representatives working collaboratively on specifics of hemorrhage control, protective equipment, interoperability of responding authorities, and exploration of the role of citizen first responders in mass casualty events.[9]

The training provided to thousands of law enforcement officers and the planning principles defined by public safety and medical authorities demonstrate that improvements are achievable in many communities; however, applying these changes locally requires changing current operating procedures, interagency planning, and conducting periodic exercises to ensure success. The capability to respond cannot wait for the mobilization of special teams. As the police response to an active shooter has shifted from special weapons and tactics teams to patrol officers, emergency medical and rescue services are challenged with ensuring a rapid, coordinated response with the police that is available at all times on every shift. Another challenge is how hospital emergency and surgical services will receive victims of active shooter incidents in areas of the country where trauma systems are resource or geographically challenged.

Changes of this magnitude require considerable support from public safety and health system authorities and other community leaders. As the sentinel events at Columbine, Fort Hood, Tucson, Sandy Hook, and Aurora each recede from the memory of the public and of government officials, there is a tendency to assign decreased priority to these low probability-high consequence incidents. This attitude is understandable, as the daily challenges of routine operations demand continued attention. However, it is important to remain mindful of the continued presence of the threat of intentional mass casualty attacks in the U.S.

Since Columbine in 1999, active shooter incidents have become more frequent. In the eight-year period after Columbine, an average of five active shooter

CHARACTERISTICS OF ACTIVE SHOOTER INCIDENTS, 2000–2012	
Locations	40% occurred in offices, stores, and industrial sites 29% occurred in schools and colleges
Shooter	All involved a single shooter
Shooting	51% were still in progress on arrival of police
Engagement of shooter	43% of attackers continuing fire on officer arrival were fired upon by officers
Wounding of police	15% of officers engaging a shooter in exchange of fire were shot

Source: Blair JP, Martaindale MH, Nichols T. Active shooter events from 2000 to 2012. *FBI Law Enforcement Bulletin.* January 2014. Available at: http://leb.fbi.gov/2014/january. Accessed June 22, 2015.

Note: *N* = 110. In a 2000–2013 study (*N* = 160), less than 2 percent of incidents involved more than one shooter.

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014. Available at: www.fbi.gov/news/stories/2014/september/fbi-releases-study-on-active-shooter-incidents/pdfs/a-study-of-active-shooter-incidents-in-the-u.s.-between-2000-and-2013. Accessed June 22, 2015.

events occurred per year. Since 2009, that figure has increased threefold.[10] A recent study by the Texas State University (TSU), San Marcos, conducted in concert with the Department of Justice, was based on police reports, public records, and media reports for 2000–2012.[11] The increased frequency of incidents seen in this study is not explained by changes in case definition or solely on the basis of increased case reporting. Characteristics of active shooter incidents from 2000 to 2012 are presented in the table on this page.

The TSU study also observed that most active shooter incidents (40 percent) occurred in offices, stores, and industrial locations. Schools and colleges were the next most common locations for these events, at 29 percent. The assailant moved between multiple locations in almost one-fifth of incidents and had no apparent connection to the shooting location almost half of the time. Shooting was still in progress on arrival of the first responding officers half of the time. This initial response was often by one or two officers. Officers responding to shooting in progress engaged the shooter in 43 percent of cases. If the officer engaged the shooter, that officer was shot 15 percent of the time. All 110 incidents in the TSU study involved one attacker. In a study of 160 incidents, 98 percent involved a single shooter.[12] In both studies the median number of victims was five.

Similarly, the effect of improvised explosive device (IED) attacks in the U.S. is not fully appreciated. The Boston Marathon bombing of 2013 is rightly remembered as a signal tragedy, but the number of injuries received by victims of IEDs from criminal behavior is not widely recognized. In the period from 1983 to 2002 there were more than 36,000 explosive incidents,

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continued on next page

Within the FBI itself, first aid training emphasizing hemorrhage control has been extended to all 13,000 special agents.

causing almost 6,000 injuries and 699 deaths.[13] Relatively unsophisticated IEDs can have serious effects, as was the case in Boston, where 264 victims included 70 hospitalizations, 16 amputations, and three deaths.[14] One estimate of the damage resulting from the Boston attack placed the economic impact at $400 million.[14]

Unlike the threat of terrorist attacks envisioned after 9/11, which were thought more likely to occur at high-profile events in major urban areas or at installations of national infrastructure, these data indicate that any community of any size is at risk. No single preventive measure, such as hardening school buildings or training teachers in emergency response, will substitute as a comprehensive response plan. Active shooter incidents do not occur solely, or even predominately, in schools and institutions of higher education.

Community leaders, including law enforcement officials, emergency medical and rescue service chiefs, and hospital-based clinicians, all play key roles in the survival of victims of intentional mass casualty events. It is fortunate that the basic elements of an effective response are already present in much of the country, but the reaction to these events is as much a problem of organization and cooperative effort as it is a matter of police tactics and clinical acumen. It is also a test of community leadership and of common determination that knowing and dealing with a threat is far superior to dismissing it as unlikely to occur in one's presence. These events, fortunately, are rare. However, although the individual risk to citizens is small, the demonstrable increase in active shooter incidents in recent years and the disproportionate potential effect of IEDs represent a continuing collective threat. It is within our power to address the threat appropriately.[15] ♦

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ACTIVE SHOOTER INCIDENTS: 2000–2013

- All but 2 incidents involved a single shooter
- In at least 9 incidents, the shooter first shot and killed a family member or members in a residence before moving to a more public location to continue shooting
- In at least 6 incidents, the shooters were female
- In 64 incidents (40%), the shooters committed suicide; 54 shooters did so at the scene of the crime
- At least 5 shooters from 4 incidents remain at large

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

ACTIVE SHOOTER INCIDENTS WITH THE HIGHEST CASUALTY COUNTS: 2000–2013

- Cinemark Century 16 Theater in Aurora, CO:
  70 (12 killed, 58 wounded)
  July 20, 2012
- Virginia Polytechnic Institute and State University in Blacksburg, VA:
  49 (32 killed, 17 wounded)
  April 16, 2007
- Fort Hood Soldier Readiness Processing Center in Fort Hood, TX:
  45 (13 killed, 32 wounded)
  November 5, 2009
- Sandy Hook Elementary School and a residence in Newtown, CT:
  29 (27 killed, 2 wounded)
  December 14, 2012

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

Public health education: The use of unique strategies to educate the public in the principles of the Hartford Consensus

by Richard H. Carmona, MD, MPH, FACS
17th U.S. Surgeon General

The devastating events of September 11, 2001, have been a disruptive force that has challenged our nation to appreciate our emergency response systems and their strengths and deficiencies. Since 9/11, billions of dollars have been spent on educating, training, and equipping our first responders in the new world order of "all-hazards preparedness." The Department of Homeland Security emerged, which sought to coordinate the needed multidisciplinary approach to prevention, response, mitigation, and recovery from all-hazards threats to the U.S. We as a nation are more prepared and better equipped than ever in our history, but major gaps still exist.

In a nation of approximately 320 million people, most of us do not understand the complex array of potential threats that we face daily. We face active shooter threats, emerging infections, man-made and naturally occurring disasters, and terrorism-related events; a poorly informed and uneducated public is a liability, as well as a loss of a potentially essential response asset. We do know that during a disaster, citizens will immediately respond and volunteer to assist the professional responders. The Hartford Consensus recognizes the need to tap the resources of the public's spontaneous volunteers during an active shooter event to reduce morbidity and mortality, especially with regard to preventable death from hemorrhage. Although active shooters are but one threat under the umbrella of the many all-hazards threats, the active shooter threat serves as a much needed nidus from which to begin to educate and coordinate the public as an essential immediate responder asset.

A brief history of civilian volunteer response

The challenge of harnessing the public's inclination to spontaneously volunteer during a catastrophe goes back thousands of years to the beginning of organized society itself. Because history is said to be the prologue to our future, it behooves us to understand and learn from the past attempts to harness the public's energy and capability during a crisis. For example, from the early U.S. colonies up to even today, most firefighters have been trained civilian volunteers. In fact, from this volunteer group, Benjamin Franklin started the first paid fire brigade in 1736.

Over the past two centuries, in peace and in war, individual and numerous nongovernment and government organizations have been created to take advantage of immediate volunteers during large-scale emergencies. These groups include, but are not limited to, civil defense programs of the Cold War and the Red Cross, Citizen Corps, and National Disaster Medical System. After 9/11, the Medical Reserve Corps (MRC), part of the Citizen Corps, was created by a Presidential Directive charging the surgeon general to create a national model to recruit, organize, educate, and train civilian volunteers nationally to assist their communities not only to meet daily health-related needs but also to be able to "surge" during an emergency to supplement the professional responders. Today there are more than 1,000 MRC teams nationally, with more than 250,000 volunteers.

The challenge before us

The increasingly complex all-hazards threats that we face as a nation—from active shooter events to severe acute respiratory syndrome and avian flu threats to Hurricane Katrina and many other catastrophic events—sometimes defy our geopolitical borders. It is now apparent that we must educate and train members of the American public to ensure that they know how to protect themselves and how to act immediately and independently during the active shooter events that

It is now apparent that we must educate and train members of the American public to ensure that they know how to protect themselves and how to act immediately and independently during the active shooter events that have been characterized by the Hartford Consensus group.

have been characterized by the Hartford Consensus group. The basic essential skills that we recommend to the public for active shooter events will also prove to be essential for other catastrophic all-hazards events facing our nation.

Skills needed for immediate responders to an active shooter event

The skills needed by a civilian immediate responder are simple but need to be executed in a complex, evolving, and sometimes unsecure environment. The immediate responder first should understand the threat of the active shooter and how law enforcement will tactically try to eliminate that threat. Immediate responders must be aware of their own safety and that of the injured. Without a thorough understanding, the immediate responder could become a liability or, worse, yet another casualty. First and foremost, the immediate responder must listen to direction from professional first responders as they arrive on scene.

The goal of the immediate responder is to stop exsanguinating hemorrhage by the simplest methods available, beginning with direct pressure and including the use of tourniquets when needed. The patient should be moved as soon as possible to a place of relative safety so as to prevent further injury.

The immediate responder, as soon as feasible, should notify professional emergency medical services responders so an assessment of the patient and first responder care rendered can be done, adequate triage can begin, and transport to definitive care can be prioritized. These steps are summarized in the Hartford Consensus THREAT acronym: ***T***hreat suppression, ***H***emorrhage control, ***R***apid ***E***xtrication to safety, ***A***ssessment by medical providers, and ***T***ransport to definitive care.

Educational theory, perishable skills, competency, and certification issues

A large body of academic information exists regarding educational methods and how best to retain perishable skills so that they will be clinically effective. We also have decades of precedent with the Red Cross' and American Heart Association's cardiopulmonary resuscitation (CPR) training and retraining of civilians. One of the most important variables in preventing death from out-of-hospital cardiac arrest has been clearly demonstrated to be well-trained immediate responders who have had CPR training and immediately institute CPR as bystanders. If not for this critical link, definitive cardiac care would not be effective, and lives would be lost. An analogy can be made with the immediate responders' stopping exsanguinating hemorrhage to stabilize a patient in preparation for lifesaving definitive trauma care.

As the public becomes engaged and is educated and trained in how to stop exsanguinating hemorrhage, we must ensure that there is continuing education and training to prevent these essential skills from perishing, because immediate responders may never actually use these skills in a crisis. First responders with this knowledge are a critical link in our survival chain and must always be prepared, just like individuals trained in CPR.

Periodical assessment of competency in the hemorrhage control skills needed is also essential not only for ensuring that quality care is being rendered, but also to make sure that the Department of Homeland Security fully understands and categorizes this immediate responder asset in our national response framework. The issue of how best to ensure the currency and competency of all immediate responders requires more discussion by our thought leaders in this area.

Developing health literate and culturally competent content for this immediate responder curriculum, as well as a national distribution network functioning at the community level, is critical to the dissemination and rapid incorporation of this Hartford Consensus model in our national response culture.

The CPR model has matured over decades and, at a minimum, can inform this discussion. In addition, Israel has a very mature and robust immediate responder model in which most citizens are prepared to serve as immediate responders; we can learn from our Israeli colleagues.

The path forward

Educating the public, the media, first responders, and medical and public health organizations is essential to ensure the need for an engaged, educated, and well-trained public to become an immediate responder asset when and if needed.

Developing health literate and culturally competent content for this immediate responder curriculum, as well as a national distribution network functioning at the community level, is critical to the dissemination and rapid incorporation of this Hartford Consensus model in our national response culture. Many national, public health, and responder-related organizations with missions that include, or are comparable to, the Hartford Consensus recommendations represented by the acronym THREAT already exist.

One national organization that comprises more than 250,000 civilian volunteers distributed to more than 1,000 communities in the U.S. and its territories is the MRC, whose mission is to enhance community health and preparedness. The MRC's work with local first responders, their respective national professional organization, and possibly the National Guard and Reserve units could constitute an already mature content distribution network with subject matter experts already available in communities nationwide.

The unprecedented and increasingly complex all-hazards threats, such as active shooters, with which our nation continues to be challenged require innovation and a public and private commitment to use all available resources to reduce morbidity and mortality. The Hartford Consensus group, which comprises national subject matter experts with the assistance of numerous professional organizations and the support of the American College of Surgeons, has advanced a thoughtful and well-informed set of recommendations to educate and train the public while strengthening our national response network.

We should move with the utmost haste to implement these recommendations because our very lives may depend on it. ♦

The continuing threat of active shooter and intentional mass casualty events: Local law enforcement and hemorrhage control

by Alexander L. Eastman, MD, MPH, FACS
Major Cities Police Chiefs Association

No matter the event type and scope, law enforcement officers (LEOs) represent the first responders to each and every active shooter/intentional mass casualty event. Even with the most aggressively integrated operations plan, the response to these events must begin with LEO response, which places LEOs in the position of being the first professional responders who have an impact on survival. Because of this unique role, hemorrhage control must be as much a core law enforcement skill as de-escalation and firearm use. Couple this unique opportunity with the fact that despite major strides in equipment, body armor, vehicle design, tactics, and the delivery of modern trauma and critical care, we have only barely improved our ability to minimize LEO injuries and deaths. To address both problems, it is imperative that we equip our officers with the knowledge and tools needed to mitigate and minimize the consequences of injuries when they occur. We must prepare to teach lifesaving skills to all our officers. What has been limited historically to the tactical team medic or delegated to a civilian fire and rescue or emergency medical services (EMS) agency now must be delivered to the hands of each officer who has the potential for hostile contact. Therefore, our nation's largest law enforcement agencies unanimously support the findings of the Hartford Consensus.

Responding to the active shooter

Today's law enforcement response to the active shooter looks nothing like it did even 15 years ago and, in fact, is again in evolution. Before the Columbine High School shooting, law enforcement response to an active shooter was the purview of specialized units such as Special Weapons and Tactics (SWAT) teams or emergency response teams. However, after active murder continued for more than 49 minutes at Columbine High School, law enforcement agencies worldwide transitioned from a "surround and contain" posture to a much more aggressive, dynamic response. More recently, using lessons learned from other active shooter events, the law enforcement response has become more dynamic, with groups such as the Texas-based Advanced Law Enforcement Rapid Response Training (ALERRT) Center's advocating rapid, dynamic, and overwhelming responses to these events. A true paradigm shift has occurred, as the response to the active shooter is no longer the responsibility of the local SWAT team, but instead is one shared by every LEO nearby. In the response to continually evolving threats, some jurisdictions are now integrating the law enforcement/EMS response in ways never before thought possible.

Introduction to law enforcement medicine

As the response to the active shooter has evolved, so has the interface between law enforcement and the medical community. Recognizing that LEOs encounter many situations on a daily basis that have some sort of medical component, many have begun to train their officers with skills and equipment that were formerly reserved for their EMS, fire, and rescue colleagues. The LEO may be the first responder to arrive at a motor vehicle collision or cardiac arrest, to respond to calls about psychotic individuals acting bizarrely or depressed and suicidal persons threatening harm, or to treat a partner injured in a shooting. SWAT officers, operating in environments inaccessible to standard EMS providers, must be able to mitigate their own injuries and continue their critical missions. Today, many U.S. police departments are forging relationships with local medical experts for assistance in managing these issues and many others that they regularly face (not to mention a relatively low-frequency but high-impact incident like an active shooter or intentional mass casualty event).

More than 180,000 LEOs in our nation's largest cities (or approximately one of every five U.S. LEOs)…are now capable of saving an injured civilian or one of their fellow officers injured in an active shooter or other situation.

Authors have described some of the components of a comprehensive law enforcement medical support program. They have described the role of law enforcement organizations in hospital disaster preparedness,[1] reviewed the impact of conducted energy weapons programs,[2] and described the fundamental priciples of civilian-sector tactical EMS.[3] Other writers have described attempts to prevent in-custody death by involvement of the medical examiner[4] and attempts to codify the role of the law enforcement agency members as medical first responders.[5]

Hemorrhage control and the law enforcement officer

It would be optimal to have a trauma surgeon at the side of every officer at the time of wounding, but that clearly is not feasible. Law enforcement physicians have been instrumental in pushing medical techniques previously thought to be used only by certified medical providers out to individuals with mere basic training. The translation of these skills from medical textbooks to wide applicability and their implementation by nontraditional responders have saved and will continue to save lives. Based on principles established in the Tactical Combat Casualty Care program, these hemorrhage control techniques are battlefield tested, have been supported by data from both military and civilian sources, and have eliminated preventable deaths in some battlefield spaces by their widespread adoption.[6] Officers who are trained in hemorrhage control and other medical techniques can treat injured persons until they can receive more advanced medical attention. LEO hemorrhage control programs must contain simple, easily replicable, easily taught, and easily learned skills and must focus on those interventions that can be applied by police officers to the injured at the point of wounding.

Because the predominant cause of preventable battlefield death is exsanguinating extremity hemorrhage, the use of tourniquets and other hemorrhage control techniques plays a large role in the management of these types of casualties. The table on page 58 lists the contents of a basic downed officer kit issued to every LEO with public contact in the Dallas (TX) Police Department (DPD). The contents mirror those of the Tactical Combat Casualty Care program, and each officer issued these kits receives training to become expert in the use of these pieces of equipment in austere environments.

Some detractors initially thought that the introduction of these skills into the armamentarium of the LEO would distract from other, more traditional law enforcement responsibilities. In fact, they have proven to be very complementary, particularly in response to the active shooter. On June 12, 2015, an assailant in an armored vehicle attacked the DPD headquarters building with automatic weapons and improvised explosive devices (IEDs). While officers returned fire, negotiated the IED-containing suspicious packages, and evacuated endangered civilians, other DPD officers ensured that no one else was injured, provided care to those who were injured, and ultimately ensured that the only loss of life that day was that of the suspect. Even in times of utmost crisis, LEOs are capable not only of performing traditional duties but also of providing care to individuals around them. Because of the dynamic nature of an incident like that one, with two distinct scenes, continuing gunfights, multiple IEDs, and multiple business and residential occupancies at risk, the scene is simply inaccessible to non-law enforcement responders such as EMS and fire and rescue services. Had there been more injuries, care would have been the responsibility of the DPD officers there. What remains clear is that the care described in the Hartford Consensus represents the best response in the unique nexus of the roles of law enforcement, trauma surgery, and public health.

DALLAS POLICE DEPARTMENT DOWNED OFFICER KIT CONTENTS
SOFTT-W tourniquet
QuikClot Combat Gauze LE
4-inch modular bandage
Latex/EMS gloves

The Hartford Consensus and the Major Cities Chiefs Association

From its inception, the agencies represented by the Major Cities Chiefs Association (MCCA) and many other law enforcement agencies around the U.S. and the world have been supporters and contributors to the Hartford Consensus. In addition to the adoption of the response concepts represented by the acronym THREAT (***T***hreat suppression, ***H***emorrhage control, ***R***apid *E*xtrication to safety, ***A***ssessment by medical providers, and ***T***ransport to definitive care), the provision of hemorrhage control has been recognized by many as a core law enforcement skill. Although data regarding specific use of hemorrhage control during active shooter situations are scarce, agencies across the country are reporting multiple lives saved with the use of these techniques. In Tucson, AZ, the police and sheriff's departments have a long history of a law enforcement agency–based hemorrhage control program. Responsible for saving more than 75 lives over the years, it is hailed as a real example of the improvement in community safety when LEOs can provide effective hemorrhage control at the point of wounding.

At the October 2013 meeting of the MCCA, the Hartford Consensus was presented to the membership and its concepts unanimously endorsed. Since that meeting, nearly 45 of the 70 agencies represented by the MCCA have completed or are in the process of training and equipping their LEOs with hemorrhage control training and equipment. This trend translates into more than 180,000 LEOs in our nation's largest cities (or approximately one of every five U.S. LEOs) who are now capable of saving an injured civilian or one of their fellow officers injured in an active shooter or other situation. These officers provide this protection to nearly 80 million Americans.

Additional agencies are coming on board each week, moving their LEOs into the present by training and equipping them with hemorrhage control equipment. Some novel and effective local partnerships exist, but our nation's trauma centers must be engaged and ensure that every law enforcement agency has both the expertise and the resources to develop these lifesaving capabilities.

Conclusions

As threats continue to evolve, our nation's LEOs will continue to be our frontline responders to incidents in which citizens are injured. We must continue to train these LEOs to meet these challenges. For individuals who face these threats or have to respond to these incidents, it is the ultimate community policing program. ♦

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ACTIVE SHOOTER INCIDENTS: 2000–2013
LAW ENFORCEMENT/SECURITY PERSONNEL CASUALTIES

- Law enforcement suffered casualties in 21 (46.7%) of the 45 incidents where they engaged the shooter to end the threat. This resulted in 9 officers killed (4 of whom were ambushed in a shooting) and 28 wounded
- In 3 (1.9%) of the 160 incidents, armed, non-sworn security personnel were killed. In 2 additional incidents, 2 unarmed security officers were killed and 2 were wounded.

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

Military history of increasing survival: The U.S. military experience with tourniquets and hemostatic dressings in the Afghanistan and Iraq conflicts

by Frank K. Butler, MD, FAAO, FUHM
Chairman, Committee on Tactical Combat Casualty Care
Department of Defense
Joint Trauma Systems

Tourniquets

Tourniquets are at least half a millennium old, and yet they were not routinely fielded and used by the U.S. military at the onset of the conflict in Afghanistan in 2001. By 2014, however, an article in the *Journal of Trauma* discussing tourniquets stated, "Tourniquets have been the signature success in battlefield trauma care in Afghanistan and Iraq. Based on the work of U.S. Army Colonel John Kragh and colleagues, the number of lives saved from this intervention has been estimated to be between 1,000 and 2,000."[1] How did the U.S. military come to make this remarkable journey?

The conventional wisdom in 2001 in civilian and most military trauma courses was that the use of a tourniquet for hemorrhage control would likely result in amputation of the injured limb and that the harmful effects of tourniquets far outweighed the benefits. The results of this mind-set were predictable. The review by Kelly et al. of combat fatalities from the early years of the conflicts in Southwest Asia found that 77 U.S. servicemen and servicewomen had bled to death from extremity wounds.[2] These deaths made up 7.8 percent of all combat fatalities reviewed. This incidence of death from extremity hemorrhage was essentially unchanged from the 7.4 percent noted in Vietnam, a quarter of a century earlier.[3]

The resurgence of tourniquet use in the U.S. military originated with the Tactical Combat Casualty Care (TCCC) program. The TCCC was the result of a military medical research effort conducted jointly by the U.S. Special Operations Command (USSOCOM) and the Uniformed Services University of the Health Sciences. This project was undertaken in 1993 to review the principles of battlefield trauma care employed by the U.S. military at the time and to see if these principles were supported by the available evidence. The product of this research effort was a paper titled "Tactical Combat Casualty Care in Special Operations," published in *Military Medicine* in 1996.[4]

Tourniquet use was a central focus of the TCCC paper. After recognizing the disconnect between the very significant incidence of preventable deaths from extremity hemorrhage in Vietnam and the ongoing failure of the U.S. military in the mid-1990s to field modern tourniquets and to train combat medical personnel in their use, the authors of the TCCC paper noted the following:

> It is very important, however, to stop major bleeding as quickly as possible, since injury to a major vessel may result in the very rapid onset of hypovolemic shock.... Although ATLS [Advanced Trauma Life Support] discourages the use of tourniquets, they are appropriate in this instance because direct pressure is hard to maintain during casualty transport under fire. Ischemic damage to the limb is rare if the tourniquet is left in place less than an hour and tourniquets are often left in place for several hours during surgical procedures. In the face of massive extremity hemorrhage, in any event, it is better to accept the small risk of ischemic damage to the limb than to lose a casualty to exsanguination…the need for immediate access to a tourniquet in such situations makes it clear that all SOF [special operations forces] operators on combat missions should have a suitable tourniquet readily available at a standard location on their battle gear and be trained in its use.[4]

Despite the publication of the TCCC paper, however, and a series of briefings to military medical audiences and senior military medical leaders, the principles of care outlined in the TCCC program gained little traction in the U.S. military before the events of September 11, 2001. The only units that adopted the TCCC prior to 2001 were the U.S. Navy SEALs, the 75th Ranger

The U.S. Central Command…mandated in 2005 that all individuals deploying to that combat theater be equipped with tourniquets and hemostatic dressings.

Regiment, the U.S. Army Special Missions Unit, the U.S. Air Force Special Operations community, and a small number of other special operations and conventional units.

The value of extremity tourniquets was also taught at the Joint Trauma Training Center in Houston from 1999 to 2001, but the recommendation for expanded tourniquet use languished. Even the units that had embraced tourniquet use at the start of the recent war in Iraq and Afghanistan did not have high-quality, commercially manufactured tourniquets and had to rely on improvised tourniquets of varying quality.

The expanded use of tourniquets in the military did not occur as a gradual evolutionary process but rather as the result of a series of discrete events in 2004 and 2005. First, in 2004, the USSOCOM funded a U.S. Army Institute of Surgical Research (USAISR) study of preventable deaths in special operations units in Afghanistan and Iraq. This study, first authored by the USAISR commander at the time, Colonel John B. Holcomb, MD, FACS, found a 15 percent incidence of preventable deaths among the special operations fatalities that had occurred through November 2004, including a number of deaths from extremity hemorrhage that could have easily been prevented with nothing more than an effective tourniquet.[5]

Second, Dr. Holcomb directed that USAISR researchers conduct a comparative study of commercially available tourniquets. This study, conducted by Tom Walters, MD, and colleagues, recommended three tourniquets for use by the military: the Combat Application Tourniquet (C-A-T), the Special Operations Forces Tactical Tourniquet (SOFTT), and the Emergency and Military Tourniquet (EMT).[6] All these tourniquets had been proven in the laboratory to be 100 percent effective in stopping arterial blood flow to extremities. The EMT, a pneumatic device, was less well-suited for battlefield use. The Committee on Tactical Combat Casualty Care (CoTCCC) subsequently recommended the C-A-T and the SOFTT as the preferred battlefield tourniquets.

Third, the TCCC Transition Initiative was funded by the USSOCOM and conducted by the USAISR. This effort, led by Sergeant First Class Dom Greydanus, was basically the medical equivalent of a rapid fielding initiative. It provided TCCC training and equipping to deploying special-operations units and incorporated methodology for determining the success or failure of the newly introduced TCCC measures. The TCCC Transition Initiative (and the U.S. Army) chose the C-A-T as the tourniquet to field.

The TCCC Transition Initiative was a resounding success and documented 67 uses of tourniquets in special-operations units with good effect and with no loss of limbs to tourniquet ischemia.[7] The first four-star endorsement of the TCCC and tourniquets occurred when General Doug Brown, Commander of the USSOCOM in 2005, mandated TCCC training and equipment for all deploying special-operations units. The U.S. Central Command, largely through the efforts of former Colonel Doug Robb, also mandated in 2005 that all individuals deploying to that combat theater be equipped with tourniquets and hemostatic dressings.

As awareness of the success of the TCCC Transition Initiative and the U.S. Central Command directive spread throughout the military, conventional units began to adopt the TCCC, including tourniquets. In 2005 and 2006, tourniquet use expanded rapidly throughout the U.S. military. The beneficial impact of the battlefield use of commercially manufactured tourniquets was very well documented by an army orthopaedic surgeon, Colonel John Kragh, during his time at a combat support hospital in Baghdad in 2006.[8]

By the end of 2011, Colonel Brian Eastridge's landmark study "Death on the Battlefield" found

By the end of 2011...preventable deaths from extremity hemorrhage had dropped from the 7.8 percent noted in the previously mentioned Kelly study to 2.6 percent, a decrease of 67 percent.

that potentially preventable deaths from extremity hemorrhage had dropped from the 7.8 percent noted in the previously mentioned Kelly study to 2.6 percent, a decrease of 67 percent.[9] The studies by Kragh and Eastridge and other U.S. military authors established the benefit of battlefield tourniquets in combat casualties. Eastridge's paper documented that as of June 2011, there were 4,596 total U.S. combat fatalities. Of these deaths, 119 servicemen and servicewomen died from isolated extremity hemorrhage. If the incidence of death from extremity hemorrhage had continued at the 7.8 percent rate observed in the Kelly study, the number of deaths from extremity hemorrhage would have been 358. In considering this number, it should be noted that Kelly's 7.8 percent incidence of death from extremity hemorrhage included fatalities up to the end of 2006 and so reflected at least some decrease in extremity hemorrhage deaths as a result of the 2005 push to expand the use of tourniquets in the U.S. military.

Holcomb, Champion, and others have documented that casualty survival in Afghanistan and Iraq was significantly higher than that observed in World Wars I and II and the Vietnam conflict.[10] This increased survival was the product of both increased use of personal protective equipment and improvements all along the continuum of care from point of wounding to discharge from the hospital. However, in a military with the highest survival rate in our nation's history, the 75th Ranger Regiment demonstrated that further improvements were possible. Kotwal and his colleagues reported an 87 percent reduction in potentially preventable deaths (3 percent compared with 24 percent in the U.S. military as a whole) through the establishment of a command-directed casualty-response program that included TCCC training and expertise for every person in the regiment—not just medics.[11]

At this time, the U.S. military has more experience with combat tourniquets than any military force in history, and U.S. servicemen and servicewomen no longer step onto the battlefield without an individual first aid kit that contains one or more tourniquets.

Hemostatic dressings

Hemostatic dressings were not part of the original TCCC guidelines. These agents were developed shortly after the onset of hostilities in Afghanistan. Both the HemCon bandage and QuikClot granules were developed commercially, and other options soon followed. The challenge to the U.S. military was to decide which of the available hemostatic options to field. Comparative studies were carried out both at the USAISR and the Naval Medical Research Center in Bethesda, MD. These studies showed that both agents improved survival compared with control groups in animal models of lethal bleeding.

The U.S. Marine Corps was the first service to field a hemostatic agent and selected the granular agent QuikClot, which was judged to be the best option available at the time. When the U.S. Army made its decision on which hemostatic agent to field, the HemCon dressing had also become available. The two agents were found to be approximately equal in efficacy, but QuikClot produced an exothermic reaction when it contacted a liquid (such as blood), which caused pain for the injured individual and produced burns. The Army elected to field HemCon, as did the USSOCOM. The use of these two agents expanded rapidly throughout the U.S. military after 2003. Two retrospective studies, one on each agent, were published by Wedmore et al. and Rhee et al. and reported good success with battlefield use of these agents.[12,13]

The TCCC has given these individuals a vastly improved set of tools and skills to better accomplish their heroic and lifesaving deeds on the battlefield, and tourniquets and hemostatic dressings are now a permanent fixture in their aid bags.

Newer hemostatic dressings became available in 2008 and underwent testing at the USAISR and the Naval Medical Research Center. These studies found that both Combat Gauze and WoundStat were consistently more effective than HemCon and QuikClot granules. As a result, the CoTCCC modified the TCCC guidelines to recommend Combat Gauze as the first-line option for the treatment of life-threatening hemorrhage not amenable to tourniquet placement because the combat medics involved in the decision expressed a strong preference for a gauze-type hemostatic agent rather than a powder or granules. WoundStat was recommended for use when Combat Gauze was not successful in controlling the hemorrhage. Subsequent safety testing at the USAISR found that WoundStat produced thromboembolic complications in animal models.[14] These findings caused the CoTCCC to remove WoundStat as a recommended agent, and its use was subsequently discontinued in the U.S. military.

Combat Gauze is now the hemostatic dressing most widely used by U.S. forces on the battlefield. The first report of Combat Gauze use in combat noted a 79 percent success rate in 14 uses among Israeli Defense Force personnel.[15] Large U.S. retrospective studies of Combat Gauze effectiveness in U.S. casualties have not yet been done.

Newer hemostatic dressings are the subject of ongoing research. A study from the Naval Medical Research Unit–San Antonio, TX, found that both Celox gauze and ChitoGauze produced higher 150-minute survival rates in the standardized USAISR femoral bleeding model than Combat Gauze. Survival was nine of 10 animals with Celox gauze, seven of 10 with ChitoGauze, seven of 10 with Combat Gauze XL, and six of 10 with Combat Gauze.[16] These differences are noteworthy but were not statistically significant. As of this writing, neither Celox gauze

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At this time, the U.S. military has more experience with combat tourniquets than any military force in history…

nor ChitoGauze have been tested in the USAISR hemostatic safety model described by Kheirabadi.[13] The U.S. military also does not have as much successful experience with these two agents as it has with Combat Gauze. For these reasons, the two agents are recommended by the CoTCCC as backup choices to Combat Gauze.

Conclusion

Never in its long and distinguished history has the U.S. military been so successful at saving the lives of individuals wounded in combat. Many dedicated professionals in the Military Health System have played key roles in bringing about the highest casualty survival rate in history: our courageous combat medical personnel, who perform amazing feats of medical care in the midst of the battle; the helicopter evacuation crews, who willingly risk their lives over and over to evacuate our casualties to safety; the superbly skilled surgical and intensive care teams in our hospitals; the Critical Care Air Transport Teams that fly desperately ill casualties thousands of miles to higher levels of care; the rehabilitation specialists, who enable our casualties to maximize their recovery of life skills and function despite their injuries; and finally, the professionals at the Joint Trauma System, who work ceaselessly to provide oversight of the entire system and make it function smoothly. To all these men and women, our nation owes a great debt.

Because most combat fatalities occur in the prehospital phase of care, our nation's combat medical providers play an especially important role in ensuring the highest casualty-survival rate possible. The TCCC has given these individuals a vastly improved set of tools and skills to better accomplish their heroic and lifesaving deeds on the battlefield, and tourniquets and hemostatic dressings are now a permanent fixture in their aid bags. ♦

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ACTIVE SHOOTER INCIDENTS: 2000–2013
DURATION OF ACTIVE SHOOTER INCIDENTS*

- 44 (69%) ended in 5 minutes or less
- 23 ended in 2 minutes or less
- Civilians had to make life-or-death decisions and therefore need to be engaged in training and decision making

*Note: This is in 64 incidents in which the duration could be ascertained.

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

Hemorrhage control devices: Tourniquets and hemostatic dressings

by John B. Holcomb, MD, FACS
Committee on Tactical Combat Casualty Care
Department of Defense
Joint Trauma Systems

Frank K. Butler, MD, FAAO, FUHM
Chairman, Committee on Tactical Combat Casualty Care
Department of Defense
Joint Trauma Systems

Peter Rhee, MD, MPH, FACS, FCCM
Committee on Tactical Combat Casualty Care
Department of Defense
Joint Trauma Systems

Hemorrhage control is the highest priority in caring for for an injured individual. To be maximally effective, hemorrhage control must occur as soon as possible after the wounding event. Unfortunately, uncontrolled hemorrhage remains the single most preventable cause of death after both military and civilian injuries. One of the most important lessons learned in the last 14 years of war is that using tourniquets and hemostatic dressings as soon as possible after injury is absolutely lifesaving.[1] The resulting sustained focus on hemorrhage control has evolved into the widespread use of two devices: commercially manufactured tourniquets and hemostatic dressings. Recent evidence from thousands of injured patients has demonstrated that the use of tourniquets does not lead to amputations and the use of tourniquets should be considered early on. Technological development has also resulted in wound dressings that are impregnated with materials that help stop bleeding more effectively than plain gauze. The U.S. military experience during the conflicts in Afghanistan and Iraq, with more than 50,000 combat casualties, taught the military trauma system that both tourniquets and hemostatic dressings are extremely important for quality care and improved outcome.

Tourniquets in the civilian setting

The wounding agents are usually different in battlefield and civilian trauma, but the lessons learned regarding hemorrhage control and optimal resuscitation are not. Recently, the American College of Surgeons Committee on Trauma and the U.S. Department of Transportation working group evaluated the evidence for external hemorrhage control measures.[2] The group's conclusions on tourniquets were that: (1) commercial windlass-type tourniquets should be used in the prehospital setting for the control of significant extremity hemorrhage when direct pressure is ineffective or impractical, (2) improvised tourniquets should be used only if no commercial device is available, and (3) a tourniquet that has been properly applied in the prehospital setting should not be released until the patient has reached definitive care. The recommendations on hemostatic agents were that: (1) topical hemostatic agents should be used in combination with direct pressure for the control of significant hemorrhage in the prehospital setting when sustained direct pressure is ineffective or impractical, and (2) topical hemostatic agents in a gauze can be used to enhance wound packing.

Hemorrhage control with tourniquets

In the 26 years between the end of the Vietnam War in 1975 and 2001, little changed in prehospital hemorrhage control. As a result, preventable deaths from extremity hemorrhage also did not change in almost three decades. After the widespread implementation of the tourniquet recommendations from the Committee on Tactical Combat Casualty Care (CoTCCC), a 10-year review of 4,596 U.S. combat fatalities noted a significant decrease in combat fatalities from extremity hemorrhage.[3] The dramatic decrease in deaths from extremity hemorrhage resulted from the now ubiquitous fielding

One of the most important lessons learned in the last 14 years of war is that using tourniquets and hemostatic dressings as soon as possible after injury is absolutely lifesaving.

of modern tourniquets and hemostatic dressings on the battlefield and aggressive training of all levels of responders in their effective use.[4]

As noted earlier, deaths from extremity hemorrhage can largely be prevented by early use of tourniquets. Because of their effectiveness at hemorrhage control and the speed with which they can be applied, tourniquets are the best option for temporary control of life-threatening extremity hemorrhage in the tactical environment when under fire. This concept can apply as well in the civilian arena, with its increasing number of mass casualty or active shooter events. These concepts become especially applicable in terrorist-style bombing events on our home soil. Direct pressure and gauze compression dressings can be effective; however, the lack of dedicated personnel to apply continuous direct pressure, a less-than-secure environment, and extremity injuries that could lead to exsanguination are all indications for rapid tourniquet application. In routine emergency medical services (EMS) care, the so-called pressure dressing for massive external hemorrhage is frequently inadequate and only effective when continuous direct manual compression is applied. Because of the personnel constraints on most civilian EMS runs, tourniquets and hemostatic dressings are both medically and logistically beneficial.[5] Despite the overwhelming evidence of benefit from the military experience, recent data indicate that only a few EMS systems are using recommended commercially manufactured tourniquets and hemostatic dressings for exsanguinating hemorrhage.

This situation continues despite numerous military publications documenting the lifesaving benefit and low incidence of complications from prehospital tourniquets and hemostatic dressings used in combat casualties. Although it is somewhat obvious, tourniquets are most effective in saving lives when applied early, before the individual has gone into shock from blood loss. Although tourniquet use has been discouraged by EMS systems in the past because of concerns about ischemic damage to the extremity, this complication is actually very rarely seen. Prolonged use of a tourniquet can potentially result in amputation, but saving the life of the individual must always take precedence if the tourniquet cannot be removed. Because of their proven lifesaving value, tourniquets are now ubiquitous on the modern battlefield, yet adoption has been slow in many civilian EMS systems.

Although limited, there are reports that the adoption of the military practice of tourniquets and hemostatic dressings into civilian EMS and emergency medicine practice is increasing. One of the key concepts that emerged was placing the hemorrhage control devices in the hands of not only all medical providers, but also the much more numerous nonmedical first-responding personnel. In the civilian sector, many police officers and firefighters now carry these devices, making them widely and rapidly available. Effective training in, and use of, hemorrhage control devices by nonmedical personnel has been a critical element in reducing preventable deaths.

In patients with severe extremity bleeding, hemorrhage control is a priority. Most extremity injuries do not require tourniquets, but patients with life-threatening bleeding do require a tourniquet. As in most trauma situations, over-triage is acceptable, as tourniquets found not to be needed can be safely removed on arrival at a hospital. The following descriptions are provided as examples of trauma victims for whom tourniquet use is appropriate:

- There is pulsatile or steady bleeding from the wound.
- Blood is pooling on the ground.
- The overlying clothes are soaked with blood.
- Bandages or makeshift bandages used to cover the wound are ineffective and steadily becoming soaked with blood.
- There is a traumatic amputation of the arm or leg.

Commercial windlass-type tourniquets should be used in the prehospital setting for the control of significant extremity hemorrhage when direct pressure is ineffective or impractical….

- There was prior bleeding, and the patient is now in shock (unconscious, confused, pale).

When treating an individual who is in obvious shock from bleeding wounds, hemorrhage control should be the first priority, before fluid resuscitation. Effective hemorrhage control does not stop with the initial tourniquet application. The military experience with tourniquets has provided some key teaching points about their use:

- Waiting too long to place a tourniquet is a mistake.
- Tourniquets should be applied just proximal to the site of the severe bleeding and never placed directly over a joint.
- Tourniquets should be tightened as necessary to stop bleeding from the distal injury.
- If bleeding is not controlled with one tourniquet, a second tourniquet should be applied just proximal to the first.
- The need for a second tourniquet is especially applicable when applying tourniquets to generously sized lower extremities.
- The purpose of tourniquets is to stop arterial bleeding. If a distal pulse is still present, the tourniquet should be tightened or a second tourniquet applied just proximal to the first, and the pulse should be checked again.
- If a tourniquet is used, it should be an effective arterial tourniquet and not an ineffective venous tourniquet, as use of the latter can increase bleeding.
- Casualties with tourniquets in place should be rechecked periodically to ensure that the tourniquet is still working and that hemorrhage is controlled.
- Pulses distal to every tourniquet should be checked.
- Correctly applied tourniquets can cause significant pain, but this pain does not signify that the tourniquet has been applied incorrectly or that it should be removed.
- Pain should be managed with analgesics as appropriate, but not for patients in shock.

Mistakes regarding tourniquets include the following:

- Not having an effective commercial tourniquet available
- Not using a tourniquet when one should be used
- Using a tourniquet for minimal or minor bleeding when one should not be used
- Putting the tourniquet on too proximally
- Not making the tourniquet tight enough to effectively stop the bleeding
- Not using a second tourniquet if needed
- Waiting too long to put the tourniquet on
- Not reevaluating the tourniquet's effectiveness
- Periodically loosening the tourniquet to allow blood flow into the injured extremity

The time when a tourniquet is applied should always be noted on the individual's body, customarily by writing the letter *T* on the person's forehead, along with the time that it was tightened. This notation should be done with an indelible ink marker to ensure that this important information does not wash or wipe off. The

The time when a tourniquet is applied should always be noted on the individual's body….

information should also be recorded on the individual's run sheet and total tourniquet ischemia time recorded in the hospital chart. Finally, all manufactured tourniquets are designed for a single use. A separate group of tourniquets should be used for training, and training tourniquets should not subsequently be issued for actual casualty use.

Improvised tourniquets

Noncommercial, or so-called improvised, tourniquets are not nearly as effective as tested and recommended tourniquets. In 2001, at the start of war in Afghanistan, the U.S. military's plan was to use improvised tourniquets. Improvised tourniquets have been found to be difficult to assemble and secure. Military experience has shown that improvised tourniquets sometimes result in preventable deaths. After unnecessary deaths early in the war, the military's strategy changed. By 2005, thousands of commercial tourniquets had been sent to the battlefield and were carried by medical and nonmedical personnel.[6] Transitioning this experience and lessons learned to the civilian arena is extremely important.[7]

Hemorrhage control with hemostatic dressings

Dressings in various forms have been used for thousands of years to help stop bleeding. At the start of the war in Afghanistan in 2001, the U.S. military used a gauze dressing that had not changed appreciably since World War I. Early in the war in Afghanistan, hemostatic dressings were developed that were lightweight, durable, and much more effective than standard gauze at stopping bleeding. After significant feedback from experienced military medics, in 2003 the CoTCCC recommended a hemostatic dressing that could be packed into a wound but that had hemostatic performance that was superior to standard gauze. These dressings were often used in conjunction with tourniquets but were especially useful in wounds not amenable to tourniquet use.[8]

Hemostatic dressings have been clearly shown to be a valuable adjunct in external hemorrhage control when the source of the bleeding is from a site not amenable to tourniquet placement. As with all devices, to ensure maximum effectiveness, the application of hemostatic dressings requires training. Critical elements are to ensure a correct packing technique and sustained manual compression for a minimum of three minutes. Simply applying the agents without maintaining pressure is not adequate to achieve the best possible hemostatic effect. Afterward, a standard pressure dressing can be applied to cover both the wound and the hemostatic dressing.

Selection of tourniquets and hemostatic agents

As civilian EMS systems make decisions about hemostatic agents, they need to be aware that research has shown that not all tourniquets and hemostatic agents are equally effective despite the manufacturers' claims and advertising. During the wars in Iraq and Afghanistan, the Department of Defense developed standardized models and techniques for evaluating tourniquets, hemostatic dressings, junctional tourniquets, chest seals, and other items designed to be used in prehospital trauma care. A review of this literature should be part of the selection process for any agency making procurement decisions about prehospital trauma equipment. Any item selected for procurement should ideally be (1) reasonable in price; (2) laboratory tested for safety and effectiveness; and (3) experience proven for safety and effectiveness.

Individual and pre-positioned trauma kits

Military experience suggests that there should be at least two lists of trauma equipment: large kits that are pre-positioned for multiple people and smaller mobile kits for officers or first responders. All professional first responders should be equipped with bleeding control kits. Firefighters and law enforcement officers should

All professional first responders should be equipped with bleeding control kits.

carry tourniquets and hemostatic dressings in a kit on their person when responding. EMS equipment in the ambulance or helicopter should include hemorrhage control kits. All trauma centers should have these devices in their emergency departments. Training is paramount. Larger pre-positioned trauma kits should be placed at optimal locations for medical coverage of local events or locations. These larger kits would supply immediate needs in an active shooter event or mass casualty situation. Examples of locations where pre-positioned trauma kits would be of value are malls, movie theaters, schools, and sporting events. There is a growing recognition that the hemorrhage control kits should be positioned next to automated external defibrillators.

Recommendation

External hemorrhage control can be accomplished easily by well-trained and well-equipped people, whether they are professional first responders or civilians. Tourniquets and hemostatic dressings should reduce preventable deaths from external hemorrhage in the civilian sector, just as they have done in the military. The recommendations for early effective hemorrhage control with commercial devices are important and similar to those of the CoTCCC, the U.S. military, the American College of Surgeons Committee on Trauma, the American College of Emergency Physicians, the National Association of Emergency Medical Technicians, and the Hartford Consensus III. The lessons learned in early hemorrhage control have been gained and applied in the crucible of battle. Widespread application of tourniquets and hemostatic dressings for hemorrhage control after civilian injury will save lives. ♦

Disclaimers

The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of Defense. This recommendation is intended to be a guideline only and is not a substitute for clinical judgment.

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LOCATION OF INCIDENTS OF ACTIVE SHOOTER EVENTS: 2003–2013

- 73 (45.%) occurred in areas of commerce
- 44 (27.5%) occurred in areas open to pedestrian traffic
- 23 (14.3%) occurred in areas closed to pedestrian traffic
- 6 (3.8%) occurred in malls
- 39 (24.4%) occurred in an educational environment

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

Intentional mass casualty events: Implications for prehospital emergency medical services systems

by Matthew J. Levy, DO, MSc, FACEP
Senior Medical Officer, Johns Hopkins Center for Law Enforcement Medicine

Domestic and international events of mass violence, including active shooter and intentional mass casualty incidents, warrant unique response considerations for prehospital emergency medical services (EMS) and first responder agencies. Regardless of whether an EMS system serves an urban, suburban, or rural community, and independent of the EMS system's architecture, these events represent a complex and challenging interagency response scenario for which all EMS agencies must be prepared. These events have resulted in multiple casualties with both blunt and penetrating injury patterns.

For any critically ill or injured patient, survival is often dependent on prompt and immediate access to lifesaving interventions. The principal concept of THREAT (***T***hreat suppression, ***H***emorrhage control, ***R***apid ***E***xtrication to safety, ***A***ssessment by medical providers, and ***T***ransport to definitive care), as outlined in the Hartford Consensus documents, provides an organized and systematic approach to the priorities of responding emergency personnel. Specifically, the notion of hemorrhage control represents a fundamental tenet of responder capability for both lay and professional rescuers, as well as for EMS system readiness. Past experience has demonstrated that those casualties with mild injuries tend to self-evacuate. These prior events also have demonstrated that civilian immediate responders will often render aid to more seriously injured victims. The role of immediate responders in providing immediate hemorrhage control cannot be underestimated and is a vital link in the chain of survival for victims.

Beyond theory, the tenets behind THREAT have been proven both on the battlefield and in the wake of some of the worse recent domestic attacks in the U.S. This concept aligns naturally with recommendations and guidelines of other allied groups, including the U.S. military's Committee on Tactical Combat Casualty Care[1] and the civilian Committee for Tactical Emergency Casualty Care.[2] Both groups emphasize the importance of early hemorrhage control, in addition to the ability to address immediately correctible causes of death, including tension pneumothorax and airway obstruction. The work of these groups has helped shape national-level policy and guidance documents, most recently including the U.S. Department of Homeland Security's June 2015 *First Responder Guide for Improving Survivability in Improvised Explosive Device and/or Active Shooter Incidents*.[3] This evidence-based document calls for a realignment of traditional emergency services practices to improve victim survivability and responder safety. It focuses on three specific areas: hemorrhage control, protective equipment, and response/incident management.

A paradigm change

Enhanced readiness to respond to active shooter and intentional mass casualty events necessitates a fundamental change in the operational paradigm of many prehospital EMS agencies. The conventional EMS training and practice of waiting for a scene to be safe before medical personal enter the scene conflicts with the need for rescuers to access those victims who have potentially survivable injuries before they die. Every minute that goes by following an event, the probability of survival decreases for critically injured patients. Lessons learned from previous incidents have taught us that waiting for the entire scene to be totally safe and without the possibility of threat results in more lives lost. We need to fundamentally change how we in EMS think about response.

Planning and operational considerations

The safety and accountability of all responders must be in the forethought of all personnel responding to active shooter and mass casualty incidents. Rescuers

Prior events also have demonstrated that civilian immediate responders will often render aid to more seriously injured victims. The role of immediate responders in providing immediate hemorrhage control cannot be underestimated and is a vital link in the chain of survival for victims.

must maintain situational awareness of the dynamic nature of these incidents, including the possibility of ambush and secondary devices intended to harm responding personnel. Rapid changes in conditions and the overarching need to evacuate personnel and patients may require incident commanders to call for real-time adjustments to the delivery of lifesaving interventions.

Responders should be encouraged to approach and evaluate potentially volatile situations in terms of calculated risk versus benefit. This concept is not foreign to emergency services agencies and is already used in normal daily fire and EMS operations. From operating on the scene of a motor vehicle crash on a busy roadway to offensive versus defensive firefighting tactics, risk-based operations are common practice in emergency services. Themes such as "Risk a lot to save a lot" are used to depict the degree of risk tolerance that responders are willing to take. In Maryland, a statewide EMS protocol was created to allow EMS personnel the necessary clinical latitude to provide lifesaving interventions in potentially volatile environments.[4] Intended to be "all hazards" in nature and modeled after THREAT, this protocol incorporates the best practices of Tactical Combat Casualty Care and Tactical Emergency Casualty Care. The protocol is threat-based in that the type of intervention to be provided is dependent on the proximity of the patient to the threat.

Various response models include the forward deployment of specially trained and equipped medical assets into the warm zone following active shooter/intentional mass casualty events. Common examples include mixed-asset teams composed of law enforcement and medical/rescue responders. Personnel assigned to such teams must be specially trained and equipped with ballistic protection appropriate for entering these environments. The success of such programs requires partnership and commitment between EMS and law enforcement agencies well ahead of an incident and should not haphazardly be implemented during the incident.

Operational and incident command considerations include early implementation of a unified command structure, designation of zones of operation, interagency and mutual aid coordination, delineation of roles, and the establishment of casualty collection points. In addition, consideration should be given to how to incorporate the assistance of immediate responders, who can serve as force multipliers to assist in providing lifesaving interventions. Operational plans and any specialized response models must be exercised and critiqued to ensure that operational issues can be addressed and mitigated. Resource documents such as the U.S. Fire Administration's *Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents* contain valuable information regarding additional operational and planning considerations.[5]

Education and training

Central to the implementation of the concepts outlined in the Harford Consensus is the structured training of prehospital personnel in the clinical issues surrounding EMS response to intentional events. The medical portion of this training should emphasize the priorities of care and immediate hemorrhage control, as well as rapid identification and correction of airway and breathing problems; it also should cover how this approach differs from the conventional rescue ABCs (airway, breathing, circulation). Personnel also should be trained in the principles of self-care and buddy care.

Training initiatives should focus on the threat-based dynamic nature of these incidents and the potential for the scene to change at any time. Comprehensive training programs should incorporate immediate action drills to ensure that essential skills of hemorrhage control are second nature. The concepts of hemorrhage

The success of such programs requires partnership and commitment between EMS and law enforcement agencies well ahead of an incident and should not haphazardly be implemented during the incident.

control can be easily integrated into mass casualty triage training. In addition to robust initial training, the low-frequency, high-consequence nature of these incidents makes it equally important to have ongoing training programs to help ensure that personnel retain these skills.

In addition to education and training for EMS personnel and professional rescuers, EMS agencies can incorporate public-access hemorrhage control training into community events, civic group meetings, and existing hands-only cardiopulmonary resuscitation training programs.

Equipment

An EMS system's readiness to respond to active shooter and intentional mass casualty events necessitates rapid access to specialized medical equipment. This equipment includes, but is not limited to, hemorrhage control devices, such as commercially available tourniquets and hemostatic dressings.

Customary practice for many EMS agencies is to centrally stockpile mass casualty equipment. However, given the immediate need for this equipment in the moments following such incidents, such stockpiles will likely not be mobilized with enough time to be clinically useful. Prompt access to lifesaving equipment requires strategic pre-placement, including the addition of these items to standard ambulance and first responder vehicle inventories. Some public safety agencies have elected to pre-deploy equipment caches in areas of high occupancy and mass gatherings, similar to the location of automatic external defibrillators.

Other essential medical equipment is recommended in resource documents, including the U.S. Department of Homeland Security's *First Responder Guide for Improving Survivability in Improvised Explosive Device and/or Active Shooter Incidents*.[3] Specialized logistical equipment, including patient-extraction devices, as well as ballistic and personal protective equipment also may be warranted. Further discussion regarding additional equipment selection is beyond the focus of this article.

Conclusion

Prehospital EMS systems represent an essential component of a comprehensive trauma network. Preparedness and response to active shooter and intentional mass casualty events require an adaptation of current EMS system practices that must at all times be balanced with a threat-based approach to operational and clinical actions. Having an enhanced preparedness for such incidents will heighten a region's resilience and improve the EMS system's ability to handle casualties from all hazards. ♦

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Role of the American College of Surgeons Committee on Trauma in the care of the injured

by Leonard J. Weireter, MD, FACS
Vice-Chair, Committee on Trauma
American College of Surgeons

Ronald M. Stewart, MD, FACS
Chair, Committee on Trauma
American College of Surgeons

Dissemination of the educational materials that will make effective immediate responders for hemorrhage control can follow the template that the American College of Surgeons (ACS) Committee on Trauma (COT) uses for its educational and quality programs. The COT has a long history of quality initiatives for injury care. Examples include offering educational programs, establishing guidelines for the care of the injured patient against which programs can be measured, and analyzing the systems within which this care is delivered.

In 1950, the ACS changed the name of the Committee on Fractures and Other Trauma to the Committee on Trauma. The committee initially focused on the treatment of fractures, but the ACS realized that injury includes more than fractures. In 1954, the manual *Early Care of Soft Tissue Injuries* was published by the COT. By 1980, the manual had seen several revisions and became Advanced Trauma Life Support® (ATLS®). This course is the most well known in the ACS portfolio, having international promulgation, and it has set the standard for teaching the initial evaluation and treatment of the injured patient. The ATLS course is taught more than a thousand times annually worldwide.

In concert with the ATLS course faculty, the COT developed the Verification Review Committee in 1987. This group developed criteria to assess trauma centers. The criteria are revised approximately every four years, with the most recent published in 2014. As of 2015, there are 433 ACS-verified trauma centers in the U.S., and requests for verification of international trauma centers have been issued.

A natural extension of the Verification Review Committee program is the Guidelines for Trauma System Consultation program. This consultation is designed to evaluate the system of care, usually at the state level, and offers a critique of the trauma system and the trauma centers that operate within this system. This program became available in 1996. There have been more than 30 state consultations since the inception of the program.

The most recent offering in the College's trauma initiatives is the ACS Trauma Quality Improvement Program. This program allows benchmarking of trauma centers against one another in a variety of quality metrics and has been available since 2005. What is clear is the long history of leadership that the ACS COT has in the promulgation of education and quality initiatives regarding the care of the injured patient.

The COT is organized into regions that oversee the presentation of course offerings. The faculty that teaches ATLS can engage local and regional resources to begin promulgation of the bleeding-control program. These resources can be other physicians, nurses, or prehospital providers who assess and treat injured patients. As the number of trained providers increases, additional instructors can be identified to facilitate ongoing outreach of the program.

Currently, ATLS is directed at physicians. Surgeons do participate in Prehospital Trauma Life Support and other educational projects with local emergency medical services, police, and nurses as needed in their communities. For a surgeon who teaches ATLS, it is a natural extension to expand to teaching basic hemorrhage control.

The target audience is anyone who might be in a position to stop bleeding—in other words, virtually everyone, as most people may be in a position to see a bleeding individual. As an example, reaching out to local municipalities to enroll police, municipal employees, teachers, and athletic coaches is easy and sensible. The infrastructure exists in the ATLS program to make widespread dissemination easy and timely. Using the reputation of the trauma

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The COT has a long history of quality initiatives for injury care. Examples include offering educational programs, establishing guidelines for the care of the injured patient against which programs can be measured, and analyzing the systems within which this care is delivered.

center and the expertise of the trauma surgeons and trauma center personnel, the bleeding control program can rapidly become credible in the mind of the public, and promulgation will be encouraged.

The Rural Trauma Team Development Course®, another educational offering of the COT, is novel in that it is designed to go out to the student audience rather than to bring the students to the course. The course takes advantage of the reality of the workplace in which people with multiple jobs now need to come together for a common goal—providing care for an injured patient. Going out into the workplace to teach a bleeding-control program makes dissemination convenient for the student and the sponsoring organization.

Imagination is the only limiting factor in moving such a course forward. Trauma centers are very imaginative in developing injury-prevention programs and presenting them to the public. Bleeding control is no different and is perhaps the ultimate prevention program. The COT possesses the expertise and infrastructure to disseminate this bleeding control program widely and quickly. ♦

EDUCATIONAL ENVIRONMENTS WERE IDENTIFIED AS THE SECOND LARGEST LOCATION GROUPING (39 [24.4 PERCENT]) OF ACTIVE SHOOTER INCIDENTS: 2003–2013

Other incidents, in descending order, were located in the following:

- Government properties (16 [10%])
  - Other (nonmilitary) government properties (11 [6.9%])
  - Military properties (5 [3.1%])
- Open spaces (15 [9.4%])
- Residences (7 [4.4%])
- Houses of worship (6 [3.8%])
- Health care facilities (4 [2.5%])

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

Integrated education of all responders

by Norman E. McSwain, MD, FACS
Medical Director, Prehospital Trauma Life Support

The Hartford Consensus issued a call to action that outlined specific activities that the public, law enforcement, emergency medical services (EMS)/fire/rescue, and definitive care need to enact to increase survival from active shooter and intentional mass casualty events. An acronym, THREAT, summarizes the recommendations: T is for threat suppression, H indicates hemorrhage control, RE denotes rapid extrication to safety, A is for assessment by medical providers, and T indicates transport to definitive care.

To answer this call to action, education of all responders in THREAT is needed. The specific educational needs of each responder group will be presented. However, it should be noted that a major tenet of The Hartford Consensus is that education should be multidisciplinary and emphasize an integrated response. All responders should consistently train and drill together.*

Public response

As was demonstrated at the Boston Marathon bombings, the uninjured or minimally injured members of the public will act as immediate responders. The public should be officially recognized as a resource in the response to mass casualty incidents and be included in planning and training for active shooter and intentional mass casualty incidents.* For details of training the public in bleeding control, please see the contribution by Richard Carmona, MD, MPH, FACS, the 17th Surgeon General of the U.S., in this compendium regarding unique strategies to educate the public in the principles of the Hartford Consensus.

Law enforcement response

The Hartford Consensus recognized that law enforcement and EMS/fire/rescue traditionally have had diverse responsibilities. Law enforcement has the responsibility for control of the scene, suppressing the perpetrator, and preserving evidence, whereas EMS/fire/rescue has the responsibility to preserve life and limb. To increase survival from active shooter and intentional mass casualty events, it is important that hemorrhage control be used as soon as possible and that first response law enforcement officers have the training necessary to be proficient at hemorrhage control. External hemorrhage control also must be regarded as a core responsibility of law enforcement. Officers must know how to use direct pressure, hemostatic dressings, and tourniquets to stop bleeding. In addition, law enforcement officers need to move the wounded as quickly as possible to areas where they can be assessed and treated by responding medical providers. EMS/fire/rescue must be integrated into the process as early as possible.*

EMS/fire/rescue response

The U.S. Fire Administration of the Federal Emergency Management Agency, U.S. Department of Homeland Security, has issued *Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents*.† This document is a resource for response planning and preparation for active shooter and mass casualty incidents. It calls for fire and EMS agencies to incorporate the THREAT principles into their standard operating procedures while developing protocols together and engaging in mutual education. A specific

*Jacobs LM, Wade DS, McSwain NE, et al. The Hartford Consensus: A call to action for THREAT, a medical disaster preparedness concept. *J Am Coll Surg.* 2014;218(3):467-475 .

†U.S. Fire Administration, FEMA. *Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents*. September 2013. Available at: https://www.usfa.fema.gov/downloads/pdf/publications/active_shooter_guide.pdf. Accessed June 30, 2015.

The public should be officially recognized as a resource in the response to mass casualty incidents and be included in planning and training for active shooter and intentional mass casualty incidents.

recommendation of the Hartford Consensus is that there be earlier integration of EMS/fire/rescue in the response. EMS personnel must know to act as quickly as possible to assess and treat the wounded. The use of casualty collection points and access corridors for EMS secured by police will compress the time between the first response by law enforcement and access to victims by EMS.* EMS personnel, including 911 dispatchers, need to know how to use direct pressure, hemostatic dressings, and tourniquets to control hemorrhage. In the event of fire, firefighter leadership must provide and identify safe zones as soon as it is feasible. Also recommended is that law enforcement and EMS/fire/rescue personnel know and use a common language as they respond. In addition, a unified command structure should be used to direct all responders.*

Definitive care

Because local facilities may not be trauma centers, it is critical that all hospitals be prepared to accept and treat severely injured patients. Hospital providers must be skilled at resuscitation and management of injuries, including surgical and radiologic interventions. To be prepared, all hospitals should routinely practice the enactment of disaster plans. Hospitals that are in proximity to places where large groups of people gather, such as shopping malls, schools, sports arenas, and movie theaters, should practice community scenarios to rehearse the rapid deployment of resources. Drills should test the emergency department and hospital-wide activation. This practice should include the management of unidentified patients, rapid internal hemorrhage control, mobilization of the blood bank, accessibility of computed tomography scanning, and the availability of surgical care with expeditious operating room activation. Plans also should include methods for constant communication and coordination between the hospital and prehospital personnel.*

*Jacobs LM, Wade DS, McSwain NE, et al. The Hartford Consensus: A call to action for THREAT, a medical disaster preparedness concept. *J Am Coll Surg.* 2014;218(3):467-475.

Conclusion

To support the principles of the Hartford Consensus, all responders in all disciplines and in all care environments should be properly trained in hemorrhage control. The following select educational programs are available to teach trauma care and hemorrhage control to medical and nonmedical individuals.

Advanced Trauma Life Support® (ATLS®)

Advanced Trauma Life Support (ATLS) was developed by the American College of Surgeons (ACS) Committee on Trauma (COT) to teach a systematic and concise method of caring for a trauma patient. The course emphasizes assessment, resuscitation, and stabilization of the patient. It also teaches how to determine if a patient should be transferred to a higher level of care and how to optimize that process if necessary. More information about the course, which is designed for physicians in the hospital environment, is available at *www.facs.org/quality%20programs/trauma/atls*.

Advanced Trauma Operative Management® (ATOM®)

Advanced Trauma Operative Management (ATOM) is designed to teach senior surgical residents, trauma fellows, military surgeons, and fully trained surgeons who infrequently operate on trauma victims the operative management of penetrating injuries to the chest and abdomen. Students are taught to identify injuries, develop a plan of care, and safely repair the injuries. ATOM is offered by the ACS

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COT. More information is available at *www.facs.org/quality-programs/trauma/education*.

Advanced Trauma Care for Nurses (ATCN)

Advanced Trauma Care for Nurses (ATCN) is designed for registered nurses to increase their ability to manage the multi-trauma patient. The course is taught concurrently with the ATLS, with nurses auditing the ATLS lectures and then participating in skill and testing stations offered by the ATCN. It is a program of the Society of Trauma Nurses. For more information, go to *www.traumanurses.org/atcn*.

Trauma Nursing Core Course (TNCC)

Trauma Nursing Core Course (TNCC) was developed by the Emergency Nurses Association to provide standardized nursing knowledge to improve the care of trauma patients, including the identification of life-threatening injuries, patient assessment, and interventions to promote better outcomes. The two-day course includes skill stations for nurses to practice a systematic approach to the trauma patient. For details, go to *https://ena.org/education/ENPC-TNCC/tncc/Pages/aboutcourse.aspx*.

Prehospital Trauma Life Support (PHTLS)

Prehospital Trauma Life Support (PHTLS) is the premier prehospital trauma education course; its mission "is to promote excellence in trauma patient management by all providers involved in the delivery of prehospital care through global education." It was developed by the National Association of Emergency Medical Technicians (NAEMT) in collaboration with the ACS COT. It is a 16-hour course offered in two formats. One format is a traditional face-to-face course with lectures and skill stations; the other format is a hybrid course in which a portion is taken online and is followed by a one-day

To support the principles of the Hartford Consensus, all responders in all disciplines and in all care environments should be properly trained in hemorrhage control.

skill session. More information is available at *www.naemt.org/education/PHTLS/whatisPHTLS.aspx*.

Tactical Combat Casualty Care (TCCC)

The NAEMT Tactical Combat Casualty Care (TCCC) course is designed to teach strategies for the best trauma care on the battlefield. TCCC guidelines are endorsed by the ACS and the NAEMT through the PHTLS program. The NAEMT TCCC course is offered under the auspices of the PHTLS program. It is designed for combat EMS/military personnel. The course can be adapted for law enforcement special weapons and tactics and special response teams. TCCC guidelines, available at *www.naemt.org/education/TCCC/TCCC_home.aspx,* provide a foundation for the standardization of tactical emergency medical support protocols.[‡]

Tactical Emergency Casualty Care (TECC)

The Committee for Tactical Emergency Casualty Care (C-TECC) was formed in 2010 to adapt military TCCC principles to civilian high threat prehospital environments. The C-TECC does not offer courses but directs that its principles be used as written by educational partners. The C-TECC is a not-for-profit organization. Representatives from several federal agencies, including the Federal Emergency Management Agency, Department of Homeland Security Office of Health Affairs, and multiple federal law enforcement agencies, are involved with C-TECC. TECC is included in the Joint Counter Terrorism Workshop Series, which is a program to assist urban areas to prepare for mass casualty incidents. More information is available at: *http://c-tecc.org/images/content/C-TECC-Overview.pdf.*

Law Enforcement and First Response Tactical Casualty Care (LEFR-TCC)

The Law Enforcement and First Response Tactical Casualty Care (LEFR-TCC) course is offered through the NAEMT PHTLS program. It is designed for public safety first responders (nonmedical) to provide them with skills for hemorrhage control and the use of gauze packs, topical hemostatic agents, and tourniquets. The course also emphasizes opening an airway. It conforms with the TECC guidelines and the recommendations of the Hartford Consensus. More information about this one-day course is available at: *www.naemt.org/education/LEFR-TCC/What IsLEFRTCC.aspx*.

Bleeding Control Course (B-Con)

The Bleeding Control Course (B-Con) is a course lasting two and a half hours to teach civilians with little or no medical training how to respond before EMS personnel arrive. It is offered through the NAEMT/PHTLS and is endorsed by the ACS COT. Examples of potential students include non-tactical law enforcement officers, firefighters, security personnel, and teachers. The course includes a lecture and skill stations for tourniquet application, wound packing, and jaw thrust. B-Con may be used along with a module about the Hartford Consensus to introduce the LEFR-TCC course to law enforcement personnel. More information is available at: *www.naemt.org/education/B-Con/WhatIsB-Con.aspx.* ♦

[‡]McSwain NE, Pons PT, eds. *Prehospital Trauma Life Support*. 8th ed. Burlington, MA: Jones and Bartlett Learning; 2014.

ACTIVE SHOOTER INCIDENTS: 2000–2013

- The study results identified 73 of 160 incidents (45.6%) that occurred in areas of commerce. These areas included businesses open to pedestrian traffic (44 [27.5%]), businesses closed to pedestrian traffic (23 [14.3%]), and malls (6 [3.8%]). These distinctions were made to determine whether the public was more at risk in areas where pedestrian traffic was likely.

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

Implementation of the Hartford Consensus initiative to increase survival from active shooter and intentional mass casualty events and to enhance the resilience of citizens

by Lenworth M. Jacobs, Jr., MD, MPH, FACS
Chairman, Hartford Consensus
Vice-President, Academic Affairs, Hartford Hospital
Member, Board of Regents, American College of Surgeons

The Joint Committee to Create a National Policy to Enhance Survivability from Active Shooter and Intentional Mass Casualty Events was founded by the American College of Surgeons (ACS) in collaboration with representatives from the federal government, the National Security Council, the U.S. military, the Federal Bureau of Investigation, and police, fire, and emergency medical organizations. The committee recognized that a strategic response to active shooter and intentional mass casualty events requires a consensus of multiple agencies and organizations, all of which have an interest in enhanced survivability but have differing philosophies and jurisdictions. The call to action declared that no one should die of uncontrolled bleeding. Preventable deaths after an active shooter or intentional mass casualty event should be eliminated through the use of a seamless integrated response system.

To develop a response system that can be effective 24 hours a day, seven days a week in any locale—whether it be a city, a suburban setting, or a rural environment—it is critical to identify the organizations and governance structures responsible for ensuring that a plan can be implemented immediately. It is then essential to identify all groups that would be available to respond to an intentional mass casualty emergency. The critical actions to enhance survival, the training necessary to achieve competence, and the necessary equipment and its immediate availability also need to be identified and be ready to be implemented.

It is essential to establish a partnership with government agencies that are responsible for making intentional mass casualty events of sufficient importance that a national initiative is implemented to mitigate injury and death. The Executive Branch of government, through a Presidential Directive, established the importance of a national response. The directive outlines areas of responsibility and appropriate time lines to implement a national solution. The federal government, through the Department of Homeland Security, Federal Emergency Management Agency, Federal Bureau of Investigation, Department of Defense, and National Security Council, has identified the elements of the problem and appropriate solutions. It has communicated this information to more than 50 organizations in the medical, law enforcement, public health, and emergency medical prehospital services arenas. The government also has included major private sector organizations in the dissemination of this information. At the state level, the departments and commissioners of public health and public safety have received guidance from Federal Emergency Management Agency as to an appropriate response, which can be tailored to local jurisdictional idiosyncrasies. The statewide directives have been transmitted to local law enforcement agencies, municipalities, hospitals, and private companies.

State of Connecticut's implementation of the Hartford Consensus initiatives

The State of Connecticut Department of Public Health has a long-standing Trauma Committee that is responsible for developing statewide plans for implementation by the Commissioner of Public Health. The Trauma Committee has representation from the hospital community, which includes all levels of trauma centers and other hospitals that receive trauma patients. Committee members include surgeons, emergency physicians, nurses, and prehospital personnel such as flight nurses, paramedics, and emergency medical technicians. The committee also has active representation from the government of the State of Connecticut through the Office of Emergency Medical Services of the Department of Public Health. Frequently there is representation from the commission of public safety, fire administration, state police, and the Connecticut Hospital Association. The Department of Public Health and the Department

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of Homeland Security of the State of Connecticut have sent senior representation to the Connecticut Trauma Committee. These representatives are responsible for the training of law enforcement officers and fire and emergency medical personnel. The importance of cross-agency involvement and collaboration cannot be overemphasized.

The Department of Public Health regulates and designates trauma centers and has a statewide trauma plan that directs the ACS to inspect and verify trauma centers on a three-year basis. This structure allows the Commissioner of Public Health to be aware of the state of readiness, education, and trauma health care in the state. It also facilitates making recommendations to the legislature for modifications in the trauma regulations. This flexibility is critical in a response to episodic activities such as terrorist events, which can generate widespread casualties, fear, confusion, and disruption within the state.

An intentional shooting in a school involving the death of 26 victims, 20 of whom were children, became a sentinel event for the trauma committee. This situation provided the impetus to educate all government and private sectors that would be involved in the management of a major traumatic event of the magnitude of the Sandy Hook Elementary School shooting. The mass casualty explosive event at the Boston Marathon further galvanized the Trauma Committee to develop and implement action plans for a fully functional response that would increase survival in the event of a similar activity occurring in the State of Connecticut.

Implementation plan

The Call to Action outlined in the Hartford Consensus I, II, and III documents was endorsed by the Trauma Committee. The implementation plan was embraced by the Department of Public Health and was included in the guidance given to the state through the Office of Emergency Medical Services. The program director of the office took an active position in integrating the training of emergency medical technicians, paramedics, flight nurses, law enforcement officers, ambulance personnel, and trauma centers within the state. Similarly, the Department of Homeland Security involved the state police and fire services in training law enforcement personnel and making sure they have appropriate equipment and devices to immediately control hemorrhage at the scene.

The Connecticut State Police has issued individual first-aid kits to all sworn members of the force. It also has initiated teaching the Tactical Combat Casualty Care course to all members, and this course is now part of the new recruit educational curriculum. The Connecticut State Police Training Academy reports that it has satisfied the following requirements outlined in The Hartford Consensus:

- External hemorrhage control is a core law enforcement skill.
- All law enforcement officers are trained in external hemorrhage control.
- Appropriate equipment, such as tourniquets and hemostatic dressings, is available to every officer.
- All officers appreciate the need for rapid assessment and triage of victims with possible internal hemorrhage for immediate evacuation to a dedicated trauma hospital.
- All officers are trained to assist emergency medical services/fire/rescue in evacuation of the injured.

The Police Academy Administrator has included a four-hour block of instruction in the First Responders Course. The academy is using this time in the

This flexibility is critical in a response to episodic activities such as terrorist events, which can generate widespread casualties, fear, confusion, and disruption within the state.

curriculum and practicum for combat casualty survival training and skills. The education includes tourniquet training and the correct placement and use of hemostatic dressings.

The Connecticut Fire Academy also has implemented emergency medical services programs. These programs include the Train the Trainer Program. The academy has purchased a number of hemorrhage control training kits, and the training simulates the management of wounds and severe hemorrhage. The academy also has implemented bleeding control and trauma bags, which are used at the Connecticut Fire Academy and other locations. Similar training programs also have been incorporated into emergency medical responder and emergency medical technician training refresher programs.

Hospital response

Hartford Hospital, one of two Level I trauma centers in the state, took a leadership role in implementing the call to action of the Hartford Consensus. It became clear that the immediate response, prehospital management, communication, and transportation of victims had to be integrally linked to the in-hospital response of the trauma center. To ensure an effective response 24 hours a day, seven days a week, specific training had to be implemented throughout the entire hospital.

In the spring of 2014, various groups throughout Hartford Hospital were offered tourniquet-application training on a voluntary basis. These groups included the board of directors; executive management team members consisting of vice-president–level staff; the LIFESTAR air medical crew; and management forum representatives consisting of managers, physicians, registered nurses, public safety officers, and other available staff. The public safety officers were especially targeted for training to comply with the Hartford Consensus recommendation that law enforcement accept bleeding control as one of its core responsibilities. The strategy of engaging the clinical and administrative leadership of the hospital in understanding the real risks and the need to be prepared in the event of a mass casualty event was critical to gaining the endorsement for widespread training of all levels of hospital personnel.

The training consisted of either a live demonstration of the application of a combat-style tourniquet and return demonstration by the learners or a video demonstration and return demonstration. Initially, the live demonstrations were used for small groups of approximately 15 to 20 individuals. A three-minute video was created to teach larger groups and on a more frequent basis. Both the live and video formats involved a presentation by a trauma surgeon who explained and demonstrated the correct steps to apply a combat-style tourniquet after first advising that personal safety should always be a priority. The demonstration, time for questions and answers, and return demonstration—the entire training—took approximately 15 minutes. The Women's Auxiliary Organization of the hospital was instrumental in providing voluntary funding for the tourniquets, hemostatic dressings, and gloves. They also funded the purchase of bleeding control bags, which were strategically placed within the hospital next to automatic external defibrillators.

Simulation education

Hartford Hospital is the major teaching hospital for the University of Connecticut. It has implemented a large, modern simulation center designed to develop hands-on competence in skills that include appropriate methods to control hemorrhage. Mannequins and simulated environments are used to replicate mass casualty disasters in the field and allow students to practice immediate management of hemorrhage. The simulation center also represents the emergency department and teaches the assessment and treatment of hemorrhage, including decision making for surgical or radiologic intervention.

The simulation center allows trainees who have demonstrated competence in the individual skills to practice their specific roles in real time as part of a team. This training allows prehospital personnel such as emergency medical technicians and paramedics to fully integrate with immediate responders at the scene, as well as with law enforcement officers and fire personnel. These exercises include comprehensive assessment

The simulation center allows trainees who have demonstrated competence in the individual skills to practice their specific roles in real time as part of a team.

and triage of victims, selection of appropriate ground and air transportation, and communications between prehospital medical personnel and personnel in the resuscitation suite of the trauma center. Full integration, including the handover from the prehospital arena to the emergency department and then to surgical intervention in the trauma center, is practiced. Members of the military, including the Navy and The National Guard also train in the simulation center.

Involvement of the nonmedical corporate and university sectors

The education and training to competence in primary hand pressure and tourniquet application for hemorrhage control of the board of trustees of Hartford Hospital had an unexpected benefit. Hartford Hospital is one of the major teaching hospitals in the city of Hartford. The State of Connecticut is home to many Fortune 500 companies and numerous universities. In the northeast there has been a long tradition of corporate leaders being involved in the governance of hospitals and health care enterprises, which is also true in Hartford. A number of the members of the board of directors of the hospital either direct large companies or serve on the boards of universities and for-profit enterprises. These individuals recognize the value of the tenets of the Hartford Consensus in preparing the state and their companies for potential intentional mass casualty events.

The president of The Hartford, a multibillion-dollar insurance company, chairs the board of directors of Hartford Hospital and was a member of the Hartford Consensus III. This participation allowed the thought processes and philosophies of corporate America to be heard and discussed by members of the Hartford Consensus. Similarly, another board member of Hartford Hospital, who was on the board of directors at the University of Hartford, facilitated the education and involvement of that university in preparedness. All these leaders recognized that in the modern era, universities, public places, and major corporate entities are all at risk for either active shooter or intentional mass casualty events. The seriousness with which these groups of leaders identified and prepared for enhancing resiliency was gratifying. The corporate leadership will facilitate meetings with the chamber of commerce of the metropolitan area, which will allow the leaders of numerous Fortune 500 corporations to be involved in disseminating these lessons and enhancing the resilience of the public.

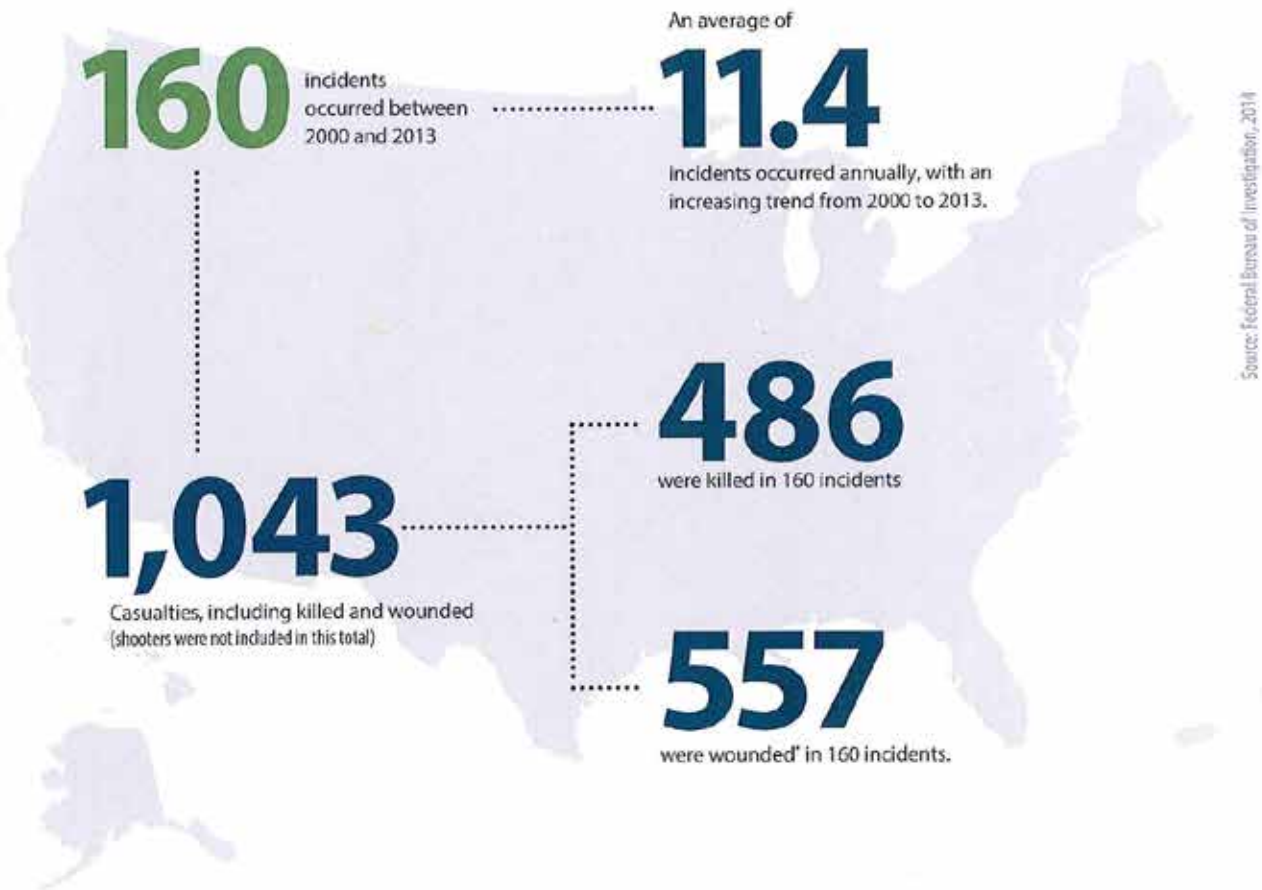
Placement and distribution of bleeding control equipment to maximize hemorrhage control

The educational process has enhanced the resiliency of hospital-based employees and their families. However, being knowledgeable about hemorrhage control without having the appropriate equipment to stop bleeding would not be appropriate. This philosophy has led to the placement of bleeding control bags with sufficient tourniquets, hemostatic dressings, and gloves to control hemorrhage from numerous extremity wounds. These bleeding control bags are placed beside automatic external defibrillators in public places in the lobbies, educational resource centers, and dining rooms of Hartford Hospital. Personal kits that contain tourniquets, hemostatic dressings, and gloves have been widely distributed to numerous personnel within the hospital system. There is no mandate to have this equipment immediately available, but the majority of the personnel have the devices on their person, in their personal carry bags, in their cars, or in their homes. Other hospitals in the region also have been educated in this process. Bridgeport Hospital, located in the largest city in Connecticut, has implemented bleeding control bags in its facility.

Each town, city, state, and municipality will have different needs and will implement the policies of the Hartford Consensus in a manner devised to enhance the resilience of the area and to increase survival from intentional mass casualty and active shooter events. It is hoped that the framework that has been implemented at Hartford Hospital, in the city of Hartford, in the metropolitan region of Greater Hartford, and throughout the State of Connecticut will serve as an exemplar for other locations throughout the U.S. ♦

An increasing threat

The following characteristics of the 160 active shooter incidents identified between 2000 and 2013 are noted:



INCIDENTS

- An average of 11.4 incidents occurred annually.
- An average of 6.4 incidents occurred in the first 7 years studied, and an average of 16.4 occurred in the last 7 years.
- 70.0% of the incidents occurred in either a commerce/business or educational environment.[10]
- Shootings occurred in 40 of 50 states and the District of Columbia.
- 60.0% of the incidents ended before police arrived.

*A handful of those identified as "wounded" were not injured by gunfire but rather suffered injuries incidental to the event, such as being hit by flying objects/shattered glass or falling while running. This does not account for all those wounded in this fashion or any mental or emotional trauma that resulted in potential medical treatment.

10 All percentages are rounded to the nearest tenth

Blair JP, Schweit KW. *A Study of Active Shooter Incidents, 2000–2013.* Texas State University and Federal Bureau of Investigation. U.S. Department of Justice, Washington, DC. 2014.

Summary

by Lenworth M. Jacobs, Jr., MD, MPH, FACS
Chairman, Hartford Consensus
Vice-President, Academic Affairs, Hartford Hospital
Member, Board of Regents, American College of Surgeons

The Presidential Directive aimed at strengthening the security and resilience of the citizens of the U.S. through systematic preparation for threats that pose the greatest risk to the security of the nation is a challenge to government, as well as private sector, organizations. The Joint Committee to Create a National Policy to Enhance Survivability from Active Shooter and Intentional Mass Casualty Events recognizes that it will require a multi-organizational, unified approach to achieve the objectives laid out in the President's Directive.

Traumatic events that result in bodily injury and severe hemorrhage can arise from a number of different sources. The nation has witnessed active shooter events in schools, universities, theaters, churches, office buildings, hospitals, and government agencies. Similarly, intentional mass casualty explosions have occurred in public places, such as at the Boston Marathon, and in government buildings. These events can occur at any time in any geographic location.

The committee recognizes that any solution that is designed to increase survival from these events must have a uniform, reproducible organizational structure. The solution also must have clear, well understood actions that all responders—including immediate responders such as the general public; first responders such as law enforcement, fire/rescue, and emergency medical services (EMS) personnel; and professional trauma responders in receiving hospitals—are aware of and practice as a team on a frequent basis.

The response to these types of events must involve the members of the public who are in the immediate vicinity of the event. These immediate responders must be empowered and educated to intervene if they wish to stop bleeding with primary pressure control applied by their hands. The first responders to an event, usually uniformed law enforcement, fire/rescue, or EMS personnel, need to be trained and equipped with the appropriate equipment and devices to enhance the primary pressure control initiated by the immediate responders. These devices, which include hemostatic dressings and tourniquets, need to be immediately available on the person of the first responder and in bleeding control kits, which should be strategically located and available within a few minutes in places at risk for these events. The committee recognizes that the traditional hot (highly dangerous) zone, warm (secure) zone, and cold zone (safe area) in an intentional shooter or mass casualty event need to be compressed, following the military model, to allow for a more rapid response from law enforcement and fire/rescue and emergency medical services.

The concepts of making hemorrhage control a law enforcement core skill and implementing a buddy system whereby any responder who sees a person with massive life-threatening hemorrhage is empowered to respond and stop the hemorrhage are critical to increasing survival from these events. Developing and implementing educational programs that teach the lay public (who are generally the immediate responders), as well as first responders and definitive-care hospital-based providers, the principles of hemorrhage control and ensure competence in applying hemostatic dressings and tourniquets can dramatically enhance the ability to control severe hemorrhage before it results in mortality.

The committee encourages various jurisdictions, whether they are statewide, regional, citywide, or local, to develop and test plans that simulate the kinds of events that have occurred in recent times throughout the nation. This preparation would include practicing responses in schools, churches, businesses, public arenas, and hospitals. Implementing the tenets of the Hartford Consensus will enhance the resilience of the public and ultimately increase survival from active shooter and intentional mass casualty events. ♦

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American College of Surgeons
633 N. Saint Clair St.
Chicago, IL 60611-3211