Training Future Physicians About Injury

Report of the Advisory Panel on Injury Prevention and Control Education for Medical Students

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Introduction

According to the Centers for Disease Control and Prevention (CDC) injury is the leading cause of death and disability among young adults, adolescents, and children in the United States. In 2000 alone, almost 50 million people in the United States reported requiring treatment for at least one injury. Approximately 150,000 Americans die each year from injury-related causes. Almost 30 percent are from motor vehicle crashes, the leading cause of injury death. Injuries result in more productive years of life lost than any other cause, with more than 4 million years of potential life lost annually; nearly double that due to cancer or heart disease. Studies have also indicated that injury is the second leading cause of direct medical costs in the civilian population, second only to cardiac and vascular diseases. In 2000, injury-attributable medical expenses were estimated to be as much as $117 billion, approximately 10 percent of total U.S. medical expenditures that year.

Injuries are defined as any unintentional or intentional (i.e., self-harm and violence) damage to the body resulting from acute exposure to thermal, mechanical, electrical, or chemical energy or from the absence of such essentials as heat or oxygen. Injuries can result from vehicle crashes, burns, drowning, falls, suffocation, and poisoning. They occur at home, at work, in transportation, or in sports and recreation. Intentional injuries stem from purposeful violent actions, such as assaults, suicide attempts, child maltreatment, and intimate partner violence, while unintentional injuries are not deliberate. Because injuries impact patients through the life cycle, health care workers should be adequately trained in injury prevention and treatment. Injury prevention refers to efforts (pre-event, event, or post-event) to reduce the risk or severity of injury. (The injury field also uses another term, “injury control,” to encompass prevention, acute care, and rehabilitation.) A medical school curriculum should ensure that all graduating medical students have a basic understanding of injury prevention and treatment that is in line with their knowledge of other major health conditions that affect the nation.

Background

Traditionally, the concepts of injury prevention and treatment have not been included as an explicit and/or independent component of the medical school curriculum. A review of curricula across the United States reveals that students receive limited exposure to this subject. Association of American Medical College (AAMC) data from its Curriculum Management and Information Tool (CurrMIT®) from 2004 show that just over one-quarter of the accredited allopathic medical schools in the United States report requiring coursework in topics associated with injury, such as trauma, substance abuse, family/domestic violence, or occupational medicine. Even fewer schools reported requiring or offering coursework in topics such as child maltreatment or sports injury.

Many medical students report that instruction in injury-related topics is insufficient. Although specialties such as occupational medicine contain specific injury-prevention components, data from the AAMC’s 2004 Medical School Graduation Questionnaire indicate that almost half of respondents believe the time devoted to their instruction in occupational medicine was inadequate. In the same questionnaire almost 20 percent of medical students believe their instruction time for family or domestic violence was inadequate.

Current Work

The public health community has directed considerable attention to the field of injury:

- The Institute of Medicine’s 1999 report Reducing the Burden of Injury: Advancing Prevention and Treatment, noted that future advancements in injury prevention and treatment were dependent on the continued development and support of the infrastructure of the field, including “Strengthening capacity for research and practice” to develop new knowledge and to translate this knowledge into effective practice.

- The Association of Schools of Public Health (ASPH) conducted a survey in 2002-2003 to assess injury training and research in schools and departments of public health. ASPH determined that while several schools have “successful injury curricula,” the majority of accredited schools offered insufficient content in the field of injury. Survey respondents identified the following as their most important needs in order to better prepare students and current practitioners: faculty recruitment with injury expertise; more courses with expanded curricula; funds for training/training programs; and funds for faculty development.
The World Health Organization (WHO) Department of Injuries and Violence Prevention works to prevent injuries and violence in part, through its efforts to enhance teaching and training programs. WHO’s comprehensive injury prevention and control curriculum TEACH-VIP, will be available to the public in September 2005.

A number of federally funded injury research centers, including Injury Control Research Centers, National Academic Centers of Excellence in Youth Violence Prevention, and National Institute of Occupational Safety and Health Education and Research Centers, are housed within or affiliated with schools of medicine. These centers take an interdisciplinary approach to studying injury etiology in order to develop effective prevention strategies and appropriate policies. However, their efforts do not necessarily include activities that directly impact medical student education.

Efforts to incorporate more extensive and consistent attention to injury within the medical school curriculum will help to support the injury prevention and prevention infrastructure and potentially increase the number of physicians with expertise in the field. A better prepared physician workforce may result in improved coordination and collaboration with public health colleagues who work in injury, particularly in acute care and rehabilitation practice.

The Expert Panel
In order to improve medical student education regarding injury, the Injury Prevention and Control Education for Medical Students Panel was convened as part of the CDC-AAMC Cooperative Agreement. The panel was supported by the CDC’s National Center for Injury Prevention and Control (NCIPC). The NCIPC was established in 1992 as the lead federal agency for injury prevention outside of the workplace and works closely with other federal agencies; national, state, and local organizations; state and local health departments; and research institutions to reduce injury, disability, death, and costs associated with injuries. The NCIPC funds and conducts applied research to better understand the causes of injuries, applying their findings to the most at-risk and most affected populations.

The panel was charged to address two fundamental questions: What should medical students learn about injury prevention and treatment (learning objectives)? What kind of educational experiences would allow students to achieve those learning objectives (educational strategies)? The questions were considered with all medical students in mind, not only those with a specific interest in injury. In order to remain consistent with the expertise of NCIPC, workplace injuries, which are a focus of another CDC organization, the National Institute for Occupational Safety and Health, were not addressed in detail during the panel discussion. In keeping with the current emphasis on content integration, the panel examined ways of incorporating these learning objectives into existing curricular structures and offerings, rather than creating new and distinct sequences of courses. The panel noted that their recommendations focus on basic and introductory concepts of the injury field, and acknowledged the importance of including injury prevention and treatment topics in graduate and continuing medical education to reinforce important themes and to promote life-long learning.

Curriculum Content
Physicians and future physicians have important roles in developing strategies, practices, and behaviors that promote safety and health in individuals and at the community level. To help decrease the morbidity and mortality associated with injury, physicians and society as a whole must appreciate that to a great extent, injuries are predictable and preventable. The study of injury must also include an understanding of the different risks of injury specific to various stages of life.

The main challenge in educating future physicians is the perception that injuries are isolated, unpredictable events and not subject to modulation and/or prevention. The panel agreed that an effective curriculum would help students understand that like other conditions and illnesses, injuries occur with distinct patterns within a population. Because risk factors and determinants of injury can be identified and modified, injuries are preventable. This perspective is the basis for the curriculum recommendations that follow.
General Principles
The following core themes must underpin the development of any injury prevention and treatment curriculum:

- Injuries, like other conditions and illnesses, occur with distinct patterns within populations.
- Injuries are frequently predictable and preventable.

An effective injury prevention and treatment curriculum should address:

Epidemiology of injury: Broad concepts addressing principles of injury epidemiology and surveillance, including how injuries are measured and counted as well as injury outcomes (morbidity, mortality, long term vs. short term disability).

Epidemiology and prevention of specific injury problems: These include both intentional and unintentional injury. Examples include assault/homicide, child maltreatment; violence against women; elder abuse, suicide/self-inflicted injury; intentional and unintentional firearm injuries; falls; fires and burns; motor vehicle occupant injuries; pedestrian injuries; bicycling injuries; injuries in sports and recreation; ingestions, including improper use of medications as well as unintentional poisonings; submersion injuries/drowning; occupational injuries.

Care of the trauma patient: Including practices in acute care and rehabilitation.

Haddon Matrix: A useful tool for establishing a contextual framework for injury prevention is the Haddon Matrix, developed by William Haddon, Jr., M.D., M.P.H. Dr. Haddon was a physician and epidemiologist who became the first administrator of the National Highway Traffic Safety Administration and is considered a founder of modern injury research. His matrix examines factors that contribute to an injurious event in the context of the standard epidemiology triad of agent-host-environment and the event sequence (i.e., before, during, and after the event). In this way, the matrix facilitates the analysis of an injury with the identification of the specific risk factors involved at each stage. Although the Haddon Matrix was first designed to study problems related to motorized vehicles, it is now applied to a broader spectrum of injuries. Table 1 depicts a Haddon Matrix for a scenario involving a motor vehicle crash.

Table 1*

<table>
<thead>
<tr>
<th>Human</th>
<th>Agent/Vehicle</th>
<th>Environment—Physical</th>
<th>Environment—Social</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Event</strong></td>
<td>Driver age, gender, experience, drug or alcohol use, vision, fatigue, frequency of travel, risk-taking behavior</td>
<td>Vehicle speed, brakes, tires, road-holding ability, visibility (e.g., daytime running lights)</td>
<td>Road design and traffic flow, road conditions, weather, traffic density, traffic control (lights, signals), visibility</td>
</tr>
<tr>
<td><strong>Event</strong></td>
<td>Age, pre-existing conditions (e.g., osteoporosis), restraint use</td>
<td>Vehicle speed, size, crash-worthiness, type of seat belts, airbag, interior surface hazards</td>
<td>Guardrails, median dividers, break-away poles, road-side hazards</td>
</tr>
<tr>
<td><strong>Post-Event</strong></td>
<td>Age, comorbidities</td>
<td>Integrity of fuel system</td>
<td>Distance from emergency medical care, obstacles to extrication</td>
</tr>
</tbody>
</table>

The information presented in the Matrix identifies associations between events and outcomes. Injury prevention interventions can target specific factors in the cells of the matrix. Pre-event, event, and post-event interventions are three distinct opportunities to prevent or lessen the consequences of injuries.

Understanding injury as a series of factors prior to and after the injurious event in this way encourages physicians to approach injury from a population health perspective, as well as from a patient-centered perspective. The physician may be better able to identify at-risk patients and to provide them with appropriate anticipatory guidance. Using the Haddon Matrix, a physician's guidance can include a discussion of the spectrum of contributing factors for injury, including environmental, engineering, social, and behavioral risk factors. The Haddon Matrix also can be used by faculty to develop curricula that address the various aspects of an injurious event. Students can use the Matrix to fully analyze injury, with an understanding of the acute treatment of and rehabilitation from injuries.

**Learning Objectives**

Learning objectives related to injury prevention and treatment should be integrated into the traditional basic science and clinical curricula, as well as into curricula focused on the public health system and physicians’ roles in larger systems of care.

Three general skills from the AAMC Medical School Objectives Project (MSOP) report, *Learning Objectives for Medical Student Education*, can serve as a foundation for learning objectives in injury prevention and treatment that address patient care issues. These are:

- The ability to obtain an accurate medical history that covers all essential aspects of the history, including issues related to age, gender, and socio-economic status
- The ability to construct appropriate management strategies (both diagnostic and therapeutic) for patients with common conditions, both acute and chronic, including medical, psychiatric, and surgical conditions, and those requiring short- and long-term rehabilitation
- The ability to communicate effectively, both orally and in writing, with patients, patients’ families, colleagues, and others with whom physicians must exchange information in carrying out their responsibilities.

In addition, the panel identified three categories of objectives that are specific to injury prevention and treatment and that include the population health perspective. These are:

- Understanding the epidemiology of injury
- The ability to deliver appropriate clinical care for injuries
- Understanding injuries in the context of health systems.

**1. Epidemiology of Injury**

The existing four-year curriculum provides many opportunities to discuss the distribution and determinants of injury in the general population. These core concepts apply to patients in a variety of health care settings.

For its part, the medical school must ensure that before graduation a student will have demonstrated, to the satisfaction of the faculty, the following:

- Knowledge of the spectrum of health conditions that are included in “injury”
- Knowledge of the scope, burden and impact of injury at both the individual and population levels
- An understanding of the emotional and mental health impacts of injury and means of ameliorating them
- Knowledge regarding the prevention of injury, including the identification of risk factors such as age-related conditions, alcohol and other substance abuse, or environmental conditions; underlying this is the understanding and acknowledgement that injuries are preventable
- Awareness of injury prevention and treatment resources (e.g., Cochrane Injuries Database, CDC-NCIPC Injury Resources, Injury Control Resource Information Network—ICRIN, Injury Prevention Web, Society for Advancement of Violence and Injury).

**2. Clinical Aspects of Injury Prevention and Care**

During clinical training, medical students should learn how to address injury and violence prevention in well-person care as well as how to recognize and treat patients presenting with both intentional and unintentional injuries. Students should be able to provide proper and professional treatment and, if appropriate, initiate the rehabilitation process.
For its part, the medical school must ensure that before graduation a student will have demonstrated, to the satisfaction of the faculty, the following:

- The ability to provide anticipatory guidance based on life stages and behavioral risk factors to patients and families to help prevent injury events as recommended by authorities such as the U.S. Preventive Services Task Force
- The ability to provide a thorough assessment of the behavioral and environmental risk factors that may have contributed to an injury and an appraisal of future preventive strategies
- The ability to recognize injuries related to mass casualty events and to understand the need to collaborate with appropriate public health and/or law enforcement officials
- The ability to avoid stereotyping in risk factor analysis and interventions
- The ability to remain nonjudgmental in their patient-care communications and interactions
- The ability to work with families and understand family dynamics in the prevention and treatment of injuries
- An understanding of the role of behavioral and psychosocial issues in the prevention and treatment of injuries.

3. Injury and Health Systems

Medical students should also be aware of how injury prevention and treatment fit into the structure and function of the health system, including the potential linkages between the medical care and public health systems.

For its part, the medical school must ensure that before graduation a student will have demonstrated, to the satisfaction of the faculty, the following:

- Knowledge of the medical-legal aspects of injury, including notification rules and completion of death certificates
- An understanding of the various systems of acute care, trauma, and rehabilitation for injury
- An understanding of patient management issues related to surge capacity and mass casualty events of varied scales and under potential continued societal threats
- An understanding of the importance of population-based injury prevention interventions such as those recommended by the Task Force on Community Preventive Services and the responsibilities and roles of physicians in these efforts
- An understanding of the importance of the quality of patient-level data that may be collected for surveillance purposes and for improving the care and rehabilitation of the injured patient
- An understanding of the expertise of related disciplines (both medical and non-medical) in the field of injury prevention and treatment, and the manners in which they should and can collectively contribute to optimize patient care and rehabilitation
- An understanding of the role of environmental and policy interventions in reducing injury risk and of the methods of influencing policy change
- An understanding of the opportunities, including leadership roles, for physician involvement in community-based interventions and policy advocacy for injury prevention
- An understanding of the role of pre-hospital emergency care in the treatment of injuries.

Learning Opportunities

General Principles

The existing medical curriculum includes dispersed opportunities to present the concepts of injury prevention and treatment throughout the four years.

1. Injury-related learning objectives should be integrated vertically through the curriculum.

Injury-related topics cut across a variety of subject areas that are part of the standard medical school curriculum. Injury-related topics should be integrated into subjects that are traditionally encountered in the first two years of undergraduate medical education (e.g., anatomy, pathology, pharmacology, biostatistics, and epidemiology), as well as in the clinical experiences that are the focus of the last two years.

2. Injury-related learning objectives should be integrated horizontally through the curriculum.

Integrating injury prevention learning objectives into multiple fields of study is an effective educational strategy. Such integration may be achieved in the clinical sciences across all specialties, with an emphasis in the fields of emergency medicine, family medicine, internal medicine, obstetrics and gynecology, pediatrics, surgery, orthopedics, geriatrics, and psychiatry.
3. A combination of didactic sessions and experiential learning exercises should be used.

Students are most effectively engaged when these experiential learning exercises carry apparent and obvious clinical significance. Experiential learning exercises may breed more positive attitudes towards the notion that injury is predictable and preventable.

Educational Strategies
Teaching strategies correspond to the varying levels of knowledge and skill required of students. Already existing didactic and experiential learning exercises may be modified to include injury topics. Case studies are extremely important in order to provide students with concrete examples and to introduce the multiple factors, determinants, and strategies involved in the comprehensive prevention and treatment of injury. More cases that are appropriate for use in medical education are needed. Additionally, schools with existing injury research infrastructure are encouraged to coordinate their educational and research activities. Such collaborations can provide students with a unique experience in the field of injury prevention, resulting in medical graduates who are in general better prepared in this topic area, as well as the potential identification of future physicians who would like to become experts in the field.

Educational strategies to help students achieve the necessary competencies in the area of injury prevention and treatment include:

- Lectures
- Directed reading

- Use of standardized patients
- Objective structured clinical examinations
- Use of existing distance-learning courses
- Use of patients logs to follow patients through treatment and rehabilitation
- Seminars to address discussing risk behaviors with patients
- Seminars to address the psychosocial aspects of treating injured patients
- Use of electronically delivered educational materials, emphasizing the increasing use of technology in the study and prevention of injury
- Collaborative student education projects with schools of public health and/or state and local public health agencies
- Student research internships in collaboration with schools of public health, health departments, federal agencies, and other injury programs
- Identification of, and access to, specialists in injury prevention and treatment who can serve as role models to foster student awareness and growth through mentored research projects, observation, and seminar experiences.

Implementation Strategies
In addition to the development of curricular resources, increasing the cadre of faculty prepared to teach injury related coursework is essential for the integration of injury prevention and treatment into the existing medical school curriculum.

Development of curricular resources
Medical school faculty and students need additional curricular resources in the field of injury prevention and treatment, particularly injury-related case studies that incorporate perspectives from relevant basic science disciplines and clinical specialties. The panel also recommended that existing resources, such as standardized patients, online modules, and elective opportunities could be modified to include injury topics. With each of these resources, the concept of levels of prevention and the analytical paradigms presented by the Haddon Matrix should be emphasized.

Faculty Development
Few medical school faculty would consider themselves injury “experts;” however, the extensive nature of the field makes it amenable to the integration of faculty from a variety of specialties. Efforts should be made to invite specialists in injury prevention and treatment into the existing faculty, who also may serve as role models to encourage the teaching of injury. Additional opportunities include the use of distance learning to both fill the gaps in teaching and to further stimulate growth of the field. Administrators are encouraged to embrace the field of injury as a legitimate academic pursuit with opportunities for advancement.

Evaluation activities
Student competency in injury prevention and treatment can be measured primarily through existing systems. This includes both written examinations and the traditional evaluation methods used in clinical medicine. The broad and
multidisciplinary nature of injury-based cases allows for a significant measure of clinical skills. Injury-based content also should be considered for inclusion in national examinations, and in reviews and evaluations of medical school curricula.

**Funding**

The advisory panel encourages CDC to support the inclusion of injury prevention and treatment curricula in medical schools. The injury control research centers funded by CDC are one vehicle for consideration. Because many of these centers are housed within or affiliated with medical schools, additional funding could be appropriated to help finance the implementation strategies noted previously.

**Examples of Innovation**

While not a comprehensive listing, the following schools have excelled in creating model educational opportunities for medical students and other health professionals in the fields of injury prevention and treatment.

**Brown Medical School**

In collaboration with the Injury Prevention Center at Rhode Island Hospital, fourth-year medical students rotating through the emergency medicine elective are provided focused instruction on injury prevention. Students receive an introductory lecture about the history of injury prevention, injury as a disease process, the science of injury prevention, the analysis of an injury event, and methods of prevention. Students later attend a case conference during which they present cases of injured patients for whom they have cared in the emergency department. They discuss host risk factors, mechanisms of injury, energy transfer, injury prevention strategies, and patient education. Finally, students are observed with their patients to assess their ability to conduct injury prevention counseling.

Students also get more concentrated exposure during the required clerkship in community health. One to three students per clerkship are assigned to the Injury Prevention Center and participate in community activities, including disseminating injury prevention information, advocating for injury prevention, and being exposed to coalition building to promote community change. During the six-week clerkship, they produce a project that they present to their classmates. Several projects have been published and presented at national meetings.

**Loyola University Chicago Stritch School of Medicine**

A collaborative team including the Illinois EMSC, Loyola University Burn & Shock Trauma Institute, and the Critical Illness & Trauma Foundation in Bozeman, Montana, developed a CD-based training program with funding from the Maternal and Child Health Bureau at the Health Resources and Services Administration. The project took two and a half years to plan and implement, and the CD was released in November 2002. The program is designed to introduce medical personnel to the field of injury prevention, with an emphasis on children. The purpose of the CD program is twofold. First, the introductory section seeks to provide an overview of the science and theoretical basis of injury prevention and treatment. Second, eight specific injury mechanisms ranging from motor vehicle crashes to falls are examined in depth. Information on these individual topic areas provide the opportunity to review it in greater detail, learn what approaches represent the best prevention practices in that area, and determine how one might get involved in injury prevention activities targeted at that specific injury mechanism. The individual topic sections also serve as a useful reference source.

**Medical College of Wisconsin**

The Injury Research Center (IRC) at the Medical College of Wisconsin has a number of activities to integrate injury prevention and treatment into the medical school curriculum. In addition to the activities outlined below, the IRC recently hosted a strategic planning session with course and clerkship directors from the medical school to understand their perspective about how injury can be further integrated into the curriculum. The IRC is using the information gathered from this session to develop a proposal for the college to fund the development of injury-based clinical cases, the integration of students into injury community health clerkships, and the development of injury-related lecture materials for course and clerkship instructors.

**Injury Research Summer Student Program:** This program provides second-year medical students with opportunities to learn about the preventable nature of injuries through weekly presentations by IRC faculty. The program also offers students the opportunity to learn about injury and clinical research methods, organize presentations, and interpret outcomes by conducting injury-related research with IRC faculty preceptors. Students present their research findings at the end of the eight-week session.
Trauma and Injury Control Integrated Selective: This selective provides an opportunity for medical students to integrate material from the first two years of medical school (epidemiology, biostatistics, ethics) into a clinical experience that blends medicine and public health. The goal of this selective is to demonstrate the importance of clinicians integrating a population perspective into their practice and taking on an expanded advocacy role.

Advanced Issues in Injury Research Elective: This elective course is targeted to third- and fourth-year medical students at the Medical College of Wisconsin who have participated in the Injury Research Summer Student Program and/or have had previous public health or injury research experience.

Objective Structured Clinical Exams (OSCEs) to assess medical student and resident competencies for providing injury prevention to patients: IRC faculty are currently developing an OSCE to assess pediatric, family, and emergency medicine residents’ competencies in providing primary and secondary prevention for intimate partner violence. The project aims are to develop the OSCE for three different clinical scenarios; pilot test the IPV OSCE; and modify and strengthen the OSCE depending on the pilot study results.

State University of New York Upstate Medical University
The Case-Based Series in Population-Oriented Prevention (C-POP) was developed and taught at the State University of New York (SUNY-Upstate Medical University) with funding from both the Josiah Macy, Jr. Foundation and the Health Resources Services Administration (HRSA). The cases are constructed to respond to the need to provide population-based learning in medical and postgraduate medical education. The cases emphasize the value of clinical prevention skills, and include actual patient encounters for common health problems. Included in this set of cases are two directly related to injury prevention and treatment. The first examines the cost-effectiveness of three interventions to increase utilization of bicycle helmets to avert head injuries in individuals 18 and older. Student are presented relevant data on the morbidity, mortality, and costs of head injuries related to bicycle use as well as a published study on the effectiveness of bicycle helmets. Students then work in groups to determine the cost-effectiveness of each of the interventions.

The second case examines the issue of prevention of adolescent and young adult suicide both at an individual and community level. The students begin by examining five deaths related to falling or jumping to determine whether they should be considered suicides. They are able to develop reporting skills and assess the epidemiology of adolescent suicidal death. The case concludes with a student evaluation of a hypothetical screening study designed as a preventive intervention and a discussion of research design to measure the screening studies effectiveness.

The complete set of cases is presented in the May 2003 supplement to the American Journal of Preventive Medicine.

University of Hawaii John A. Burns School of Medicine
The Asian/Pacific Islander Youth Violence Prevention Center (API Center) is a collaboration between the University of Hawaii Department of Psychiatry and the National Council on Crime and Delinquency (NCCD). The goal of the API Center is to prevent and reduce youth violence among the API population and to help communities become proactive in creating a safe and healthy environment. Among its central activities is enhanced curriculum development for health professionals at all levels. Specific to undergraduate medical education, they have integrated violence prevention themes into pre-clerkship community medicine experiences, paper cases in problem-based learning, and formal teaching sessions during the psychiatry clerkship, focused on interviewing, safety assessment, and bio-psycho-social-cultural formulation and treatment.

University of Iowa Carver College of Medicine
The University of Iowa Carver College of Medicine uses case-based learning to provide a comprehensive and integrated approach to medical education. Cases are presented to small groups of medical students, who discuss aspects of the case history. Several cases within the field of injury prevention are used, including cases that integrate concepts of motor vehicle trauma, child abuse, domestic violence, burns, and the prevention of these injuries. Students learn the medical impact of injuries as well as the importance and role of the physician in injury and violence prevention and treatment.
Electronic References

Internet Resources (Please note that this list is not exhaustive. Many of the sites noted are “meta-sites” with numerous links to additional sites of relevance.)

American Academy of Pediatrics (AAP)
www.aap.org/sections/ipp/IPP-Map-Gen.html
Section of injury prevention and poison control.

American College of Emergency Physicians (ACEP)
www.acep.org/1,32396,0.html
ACEP Section on Injury Prevention and Control.

American College of Surgeons (ACS)
www.facs.org/dept/trauma/injmenu.html
ACS Subcommittee on Injury Prevention and Control, including selected readings and links.

American Medical Association (AMA)
www.ama-assn.org/ama/pub/category/2281.html
Statistics and resources on unintentional injury and adolescents.

American Public Health Association (APHA)
www.icehs.org/
Injury Control and Emergency Health Services Section
A national forum for all professionals committed to the prevention and treatment of violence and unintentional injuries, and to the delivery of emergency health care services.

Association of State and Territorial Health Officials (ASTHO)
www.astho.org/?template=innovative_programs.html
ASTHO activities, resources and presentations from their prevention hub.

Centers for Disease Control and Prevention (CDC-NCIPC)
www.cdc.gov/ncipc/default.htm
National Center for Injury Prevention and Control
www.cdc.gov/niosh/homepage.html
National Institute for Occupational Safety and Health
Consumer Product Safety Commission
www.cpsc.gov
An independent federal regulatory agency that works to save lives and keep families safe by reducing the risk of injuries and deaths associated with consumer products.

Guide to Clinical Preventive Services
www.ahcpr.gov/clinic/cps3dix.htm#injury
The U.S. Preventive Services Task Force has reviewed the evidence of effectiveness and developed recommendations for clinical preventive services that address family violence; household and recreational injuries; and motor vehicle injuries.

Guide to Community Preventive Services
www.thecommunityguide.org/violence/default.htm

Injury Control Resource Information Network
www.injurycontrol.com/icrin/
A dynamic list of key Internet-accessible resources related to the field of injury research.

Injury Prevention
http://ip.bmjournals.com/
Open access to the journal Injury Prevention.

Injury Prevention Web
www.injuryprevention.org
Comprehensive resource for literature, data, and links related to injury prevention and treatment.

National Association of County and City Health Officials (NACCHO)
www.naccho.org/search.cfm?topicID=53&numresults=all&showabstract=yes
NACCHO activities, press releases, educational resources and related links on injury prevention and treatment.
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National Highway Traffic Safety Administration (NHTSA)  
www.nhtsa.gov  
Responsible for reducing deaths, injuries and economic losses resulting from motor vehicle crashes.

National Injury and Violence Prevention Training Initiative  
www.injuryed.org  
In 2001, The State and Territorial Injury Prevention Directors Association (STIPDA) and National Association of Injury Control Research Centers (NAICRC) formed the Joint Committee on Infrastructure Development. Together they identified the requisite skills and knowledge health professionals should possess in the field of injury and violence prevention. Nine competencies and related learning objectives were identified. This formed the basis for an initiative aimed at enhancing the injury prevention infrastructure in the United States, supported by the Maternal and Child Health Bureau, and the National Center for Injury Prevention and Control at CDC. Training opportunities include clearinghouse resources, conferences, distance education courses, workshops, and seminar series. Their Web site includes resources on continuing education for injury practitioners in state, local, and tribal health departments and their diverse partners.

National Youth Violence Prevention Resource Center (NYPRC)  
www.safetyouth.org  
A single point of access for information and materials available from federal agencies working to prevent violence and suicide among the nation’s youth. Information is provided about prevention programs, publications, research, statistics, and fact sheets.

Prevent Program (Preventing Violence Through Education, Networking and Technical Assistance)  
www.prevent.unc.edu  
Supported by funding from the National Center for Injury Prevention and Control as part of the National Training Initiative in Injury and Violence Prevention, this is a multifaceted training program to engage teams of professionals in developing primary prevention approaches to the prevention of intimate partner violence, sexual violence, youth violence, suicide, and child maltreatment. Distance learning modules are available online.

Society for Advancement of Violence and Injury Research, (SAVIR)  
www.naicrc.org/  
Contains member information in the form of links to affiliates and organizational background, along with a variety of information and databases aimed at academic/research interests.

State and Territorial Injury Prevention Directors Association (STIPDA)  
www.stipda.org/  
Information on state-of-the-art injury prevention and treatment policies and strategies from public health injury professionals representing all U.S. states and territories.

World Health Organization (WHO)  
www5.who.int/violence_injury_prevention/main.cfm?p=000000079  
Comprehensive source for WHO activities related to injury prevention and treatment.
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* Deborah Danoff, M.D., convened the expert panel while she was an Associate Vice President in the Division of Medical Education
Endnotes


14 ASPH’s 2002 survey also documents this fact, stating that only two of the accredited schools offer students a formalized specialization, academic track, or concentration in injury. In the majority of schools, the only comprehensive study of injury in the context of multiple causes and events, occurs in a medical student’s first or second year training in the basic principles of Biostatistics or Epidemiology.

15 Association of American Medical Colleges. Learning Objectives for Medical Student Education: Guidelines for Medical Schools. Medical School Objectives Project, Report I; 1998.