Preventing Injuries in America: Public Health in Action

The problem of injury in America is complex. Many types of injury exist—both unintentional and violence-related. For each type of injury, CDC's Injury Center has a key role in translating research into effective prevention strategies.

This part of the *CDC Injury Fact Book* contains detailed information about a range of injuries, from acute injury care to youth violence. Each section includes data that describe the extent of the injury problem, provide an overview of CDC's accomplishments in research and prevention efforts, and present future steps the Injury Center and its partners must take to reduce injuries and resulting deaths and disabilities.

Acute Injury Care and Treatment

The Problem

Injuries have physical, emotional, and financial consequences that can impact the lives of individuals, families, and society. Some injuries can result in temporary or long-term disability. Injuries also place an enormous burden on emergency departments (EDs) and trauma care systems.

- In 2002, there were 110.2 million visits to EDs in the United States, representing a 23% increase from the 89.8 million ED visits in 1992. During the same period, the number of EDs in the United States decreased by about 15% (McCaig and Burt 2004).
- The overall rate of ED use in 2002 was 38.9 visits per 100 persons (McCaig and Burt 2004).
- In 2002, fewer than 1 of every 100 ED visits required immediate attention (McCaig and Burt 2004).
- Falls, being struck, or striking against something or someone, and motor vehicle traffic crashes were the leading causes of injuries seen in EDs, accounting for about 40% of ED visits (McCaig and Burt 2004).

CDC's Accomplishments

CDC Acute Injury Care Research Agenda

In 2003, CDC's Injury Center reviewed its current *CDC Injury Research Agenda* chapter on acute care, disability, and rehabilitation. Of the thirteen priority areas for research, only three areas addressed acute injury care, and none dealt with acute injury care in the context of terrorism preparedness and response. Recognizing these gaps, the Injury Center and its partners revised the *CDC Injury Research Agenda's* chapter about acute injury care. This two-year revision process engaged experts from the continuum of injury care and public health. The *Acute Injury Care Research Agenda* was released at the 2005 National Injury Prevention and Control Conference. Representatives of government agencies and national organizations involved in acute injury care have already begun to identify available resources to fully implement the revised research agenda.

Revision of field triage criteria

CDC convened several meetings of emergency care professionals to discuss the status, direction, and next steps for standardizing care of acutely injured people. Participants, including emergency physicians, first responders, and other emergency service providers, agreed to revise the 20-year-old national field triage guidelines. The group also will help develop a tool kit to serve as an information resource for emergency medical service providers.

Prehospital care around the world

In 2004, prior to the 7th Annual World Injury Conference, CDC convened a meeting in Vienna, Austria, of individuals and organizations active in providing prehospital care to discuss its role in the developing world. Participants reviewed current evidence, examined affordable and effective prehospital interventions, established research priorities, and discussed the role of prehospital care in the larger health system. They also identified future initiatives and directions for the development of prehospital care systems in low-income countries. In 2005, the World Health Organization published a report and recommendations from this meeting, representing more than five years work in worldwide prehospital care.

National Trauma Data Bank, National Sample Project

In 2004, CDC supported the American College of Surgeons (ACS) to develop a nationally-representative sample of U.S. trauma centers that provides data on treated trauma patients. This National Sample Project (NSP) will enhance the ACS's National Trauma Data Bank (NTDB) by providing data to meet the broad range of trauma care assessment, clinical outcomes research, and injury surveillance needs. The NTDB is the largest compilation of traumatic injury data ever assembled, with far-reaching implications for areas such as epidemiology, injury control, research, education, acute care, and resource allocation. Using a representative sample of 100 hospital trauma centers, NSP researchers can make statistically valid inferences about patient care in Level 1 and 2 trauma centers in the United States.

A **trauma care system** is an organized effort, coordinated by a state or local agency, to deliver the full spectrum of care (from acute injury care to rehabilitation) to injured persons in a defined geographic area.

Such a system requires specially trained practitioners and adequate resources, equipment, and support personnel.

Our nation's trauma care systems are in various stages of development, implementation, and evaluation (American College of Emergency Physicians 1999). Although 80% of Americans can access a trauma center within an hour, about 46.7 million Americans cannot (Branas et al. 2005). Some areas lack adequate trauma care—despite evidence that trauma care reduces death and disability rates (Bass et al. 1999).

Conference to discuss alcohol and drug problems among trauma patients

In 2003, CDC convened a conference entitled "Alcohol and Other Drug Problems Among Hospitalized Trauma Patients: Controlling Complications, Mortality, and Trauma Recidivism." The goal of this conference was to develop a set of research and policy recommendations to improve clinical alcohol and drug prevention and intervention services for trauma patients. Participants included government representatives, trauma surgeons, and substance-abuse treatment researchers. Conference proceedings include recommendations, papers, and detailed summaries of discussion sessions. The proceedings were published as a special supplement to the *Journal of Trauma* in December 2005.

Beginning in fall 2006 and, in part, because of these recommendations, the American College of Surgeons Committee on Trauma (ACS-COT) will require Levels 1 and 2 trauma centers to have a mechanism to identify patients who are problem drinkers. Level 1 centers must also have the capability to provide an intervention for patients identified as problem drinkers. This requirement will be included in the revised 2006 version of *Resources for Optimal Care of the Injured Patient,* published by the ACS-COT.

Research and literature on alcohol and drug problems among college students

CDC-authored research was published in the *Journal of American College Health's* article "Screening and Brief Intervention for Alcohol Problems Among College Students Treated in a University Hospital Emergency Department." This research suggests that EDs can serve as appropriate venues in which to screen patients for alcohol problems.

CDC-funded research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to acute injury care. Examples of extramural research projects follow. For more information about these and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Brief interventions in the ED to reduce risky driving.** University of Cincinnati researchers are testing the effectiveness of administering screening and brief intervention in the ED to limit drivers' problem drinking and risky driving behaviors (i.e., lack of seat belt use). This prospective, randomized controlled trial will result in a cost-benefit analysis from the perspectives of society overall and hospitals specifically.
- **Health-related quality of life in trauma.** The Johns Hopkins Bloomberg School of Public Health examined approaches for incorporating deaths into an analysis of trauma outcomes. The resulting approaches can be used to estimate the burden of injury in years of healthy life lost. The chief aim of the study was to develop a method for calculating population-based estimates of the burden of major trauma overall and for specific subgroups of people who sustain traumatic injuries (i.e., traumatic brain injury, motor vehicle-related trauma). This research was published in a 2003 *Epidemiologic Review* article titled "Measuring the Public Health Impact of Injuries." The study supplements the ongoing National Study on the Costs and Outcomes of Trauma Care (NSCOT), which compares the costs and outcomes of care provided in hospitals with and without trauma centers.
- **Outcomes of elderly patients hospitalized with injuries.** Rates of mortality from injury increase with age, and older adults constitute a disproportionate fraction of patients hospitalized with injuries. Researchers at Harvard University's School of Public Health are examining measures to ensure quality care for this increasingly large segment of the population. Using Medicare data, researchers will study how factors such as patient's age and sex, region of the country, hospital volume, and physician experience may affect quality of care. Findings may help improve or standardize care for patients of all ages, and particularly older adults.

Future Steps

During the next several years, CDC will focus on three overarching goals to improve acute injury care:

- Enhance the medical and public health systems' ability to reduce morbidity, mortality, and disabilities among people injured in a mass casualty event.
- Increase the survival and improve the quality of life for injured people through advances in emergency medical response systems and injury care.
- Enhance the ability of state health departments to monitor injuries and to develop and implement injury prevention programs.

CDC will accomplish these goals by completing new and existing initiatives such as those listed below.

Continued development of a national resource for trauma care data

CDC will continue working with the American Trauma Society to enhance the Trauma Information and Exchange Program (TIEP) as a national resource for trauma center and trauma system information. This effort involves maintaining and expanding inventory data and the scope of these data. Surveys will continue to be distributed among trauma centers and systems affiliated with TIEP to identify key issues in trauma care and to provide meaningful feedback on how TIEP can better serve agencies within its network. TIEP has also developed measures of access to trauma care, using these measures to assess the availability of trauma care across the country and to identify gaps in coverage. Ongoing evaluation and maintenance enable TIEP to provide current information to policy makers, the trauma community, and the public about the status, contributions, and needs of trauma care systems.

Insurance laws and substance abuse screening

CDC is collaborating with four other federal agencies to evaluate the impact of insurance laws on screening and interventions for substance-use problems among acute injury care patients. This project will examine the impact that current state insurance laws have on the detection and treatment of acute injury care patients with substance-use problems; identify and evaluate barriers to improving the standard of care for acute injury care patients with substance-use problems; and explore alternate legal, policy, and economic scenarios to pave the way for improved practice.

Interface between emergency medical system and public health professionals

Emergency service providers and public health professionals share a mutual commitment to saving lives, although strategies to achieve this goal are fundamentally different. Discussions between emergency service providers and public health workers have revealed that the two disciplines are not mutually exclusive. Because each discipline can benefit by using the relevant knowledge and practices of the other, CDC supported the American Public Health Association (APHA) in 2004 to develop a curriculum outline on the interface between the emergency medical system and public health. The outline is being developed into a full curriculum that identifies opportunities and methods to integrate public health and emergency service practices that will enhance day-to-day operations and increase readiness in disaster situations.

Interventions that address acute injury care

CDC is funding three extramural research grants that address priorities in the *Acute Injury Care Research Agenda: Guiding Research for the Future.* The grants include a study on a randomized effectiveness trial to reduce the impact of acute pediatric injury; a patient-centered study to improve trauma outcomes; and a prospective, multicenter, observational study of children with blunt abdominal trauma.

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Alcohol-related Motor Vehicle Injuries

The Problem

An alcohol-related motor vehicle crash kills someone every 31 minutes and nonfatally injures someone every 2 minutes (NHTSA 2004).

- In 2003, 17,013 people died in alcohol-related motor vehicle crashes, representing 40% of the year's total traffic deaths (NHTSA 2004).
- More than 1.4 million drivers were arrested in 2001 for driving under the influence of alcohol or narcotics (DOJ 2002). This number is slightly more than 1% of the estimated 120 million or more episodes of impaired driving that occur among U.S. adults each year (Dellinger, Bolen, and Sacks 1999; Liu et al. 1997).
- About 3 in 10 Americans are involved in an alcohol-related crash in their lifetimes (NHTSA 2001).
- After more than a decade of declining rates in alcohol-related fatal crashes in the United States, rates have begun to climb. Since 1999, rates have increased between 4% and 10% for all age groups, except ages 16 to 17 years (Elder and Shults 2002).
- Each year, alcohol-related motor vehicle crashes in the United States cost approximately $51 billion (Blincoe et al. 2002).

CDC's Accomplishments

State DUI prevention activities to reduce alcohol-impaired driving

CDC scientists found that in states actively working to prevent DUI, fewer drivers report drinking and driving. The researchers examined the association between states' grades on the 1999 Mothers Against Drunk Driving (MADD) Rating the States survey, which graded states on their DUI countermeasures from 1996 to 1999, and on 1997 Behavioral Risk Factor Surveillance System (BRFSS) data on residents' self-reported drinking and driving. They found that residents of states with a MADD grade of "D" were 60% more likely to report alcohol-impaired driving than were residents from states with a MADD grade of "A."

Identifying effective interventions against alcohol-impaired driving

In systematic reviews of published research studies, a team of researchers led by CDC found strong evidence for the effectiveness of 0.08% blood alcohol concentration (BAC) laws, minimum legal drinking age laws, sobriety checkpoints, and mass media campaigns that meet certain conditions (i.e., careful audience research, adequate audience exposure, and presence of other alcohol-impaired driving prevention activities). They also found sufficient evidence of the effectiveness for lower BAC laws for young or inexperienced drivers (zero tolerance laws), and intervention training programs for alcohol servers. Finally, they found sufficient evidence that school-based education programs decrease riding with alcohol-impaired drivers (though there was insufficient evidence about the effects on alcohol-impaired driving). These interventions were effective in reducing fatal and nonfatal, alcohol-related motor vehicle crashes. These reviews, published in *The Guide to Community Preventive Services* in 2005, are available online. Please visit www.thecommunityguide.org.

Mass media campaigns to reduce alcohol-related crashes

Under certain conditions, mass media campaigns are effective in preventing alcohol-impaired driving, according to a CDC report published in July 2004 in the *American Journal of Preventive Medicine*. Based on these findings, the Task Force on Community Preventive Services—a 15-member, nonfederal group with expertise in public health policy and behavioral and social sciences—issued a recommendation for mass media campaigns that are carefully planned and well executed, attain adequate audience exposure, and are implemented in conjunction with other ongoing alcohol-impaired driving prevention activities. The systematic review found that under these conditions, mass media campaigns generally reduced alcohol-related crashes by about 14%. Economic analyses indicated that such campaigns also result in societal benefits that exceed their costs.

Just the Facts . . .

Children and Drinking Drivers

A CDC study of traffic crashes from 1997 to 2002 found that approximately 390 children ages 14 years and younger died each of those years in alcohol-related crashes in the United States. More than two thirds of the children killed were riding with the drinking driver at the time of the crash. The study also found that child passenger restraint use decreased as the blood alcohol concentration of the child's driver increased. In cases where restraint use was recorded, only 32% of fatally injured child passengers of drinking drivers were restrained at the time of the crash (Shults 2004).

Protecting children from drinking drivers

CDC's research found that about 68% of the children killed in alcohol-related crashes were riding in cars driven by drinking drivers. After these data were released, legislators in several states introduced bills to help protect children from drinking drivers. Such legislation creates special penalties under state child abuse laws for people who transport children while driving drunk.

Future Steps

Based on data from the National Highway Traffic Safety Administration and the U.S. Census Bureau, the rate of fatalities in alcohol-related motor vehicle crashes decreased 13% from 1993 to 2002, from 6.9 to 6.0 per 100,000 persons. However, this rate will need to decline substantially to meet the Healthy People 2010 objective of 4.0 per 100,000 persons. Additionally, while alcohol-related fatal crash rates have decreased over the past two decades by 60% for drivers ages 16 to 17 and by 55% for drivers ages 18 to 20, progress has stalled in the past few years. To further decrease fatal alcohol-related crashes among young drivers, communities need to implement and enforce strategies that are known to be effective, such as minimum legal drinking age laws and "zero tolerance" laws for drivers under 21 years of age.

CDC is involved in the following activities to help reduce alcohol-related motor vehicle crashes among drivers of all ages.

Guide to Community Preventive Services

In addition to evaluating and sharing information about what works to prevent impaired driving, CDC must support communities in implementing proven interventions. Efforts are currently underway to link recommendations in the *Community Guide* with detailed information about how to implement them and to provide examples of model programs when possible.

Cooperative agreements with Native American tribes

To help address the serious problems with motor vehicle-related injuries and fatalities in Native American communities, the Injury Center has funded four tribes to implement recommended interventions from the *Community Guide*. Two of the communities will implement recommended interventions to prevent alcohol-impaired driving. With the assistance of Injury Center staff, our partners will adapt these interventions and evaluate their effectiveness in tribal communities.

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Child Maltreatment

The Problem

- The true number of children who are victims of child maltreatment in the United States is unknown. Information about child abuse and neglect cases that came to the attention of Child Protective Services (CPS) agencies in 2002 indicates that:
  - Nearly 900,000 children were confirmed to be victims of child abuse or neglect (ACF 2004).
  - More than 60% of these victims suffered neglect (including medical neglect); almost 20% were physically abused; 10% were sexually abused; and 7% were emotionally or psychologically abused (ACF 2004).
  - An estimated 1,400 children died from maltreatment. One third of these deaths were from neglect. Physical and sexual abuse were also major contributors to fatalities (ACF 2004).
- Infants are at greatest risk of homicide during the first week of infancy, with the risk being highest on the first day of life (Paulozzi 2002).
- Child maltreatment through blunt trauma to the head or violent shaking is a leading cause of head injury among infants and young children (Committee on Child Abuse and Neglect 2001).
- The perpetrators of child maltreatment are most often parents. In 2002, one or both parents were involved in 79% of child abuse or neglect fatalities (National Clearinghouse 2004).
- Children who experience maltreatment are at increased risk for experiencing adverse health effects and behaviors as adults, including smoking, alcoholism, drug abuse, physical inactivity, severe obesity, depression, suicide, sexual promiscuity, and certain chronic diseases (Felitti et al. 1998).

- Victims of child maltreatment are also at increased risk of experiencing violence as adults. A national survey found that victims who were physically assaulted by caregivers were twice as likely to be physically assaulted as adults (Tjaden and Thoennes 2000).
- As many as one third of parents who experienced maltreatment in childhood may victimize their own children (Fromm 2001).

CDC's Accomplishments

Sociocultural and community risk and protective factors for child maltreatment and youth violence

CDC is funding researchers at the University of Georgia in Athens to examine the sociocultural and community risk and protective factors associated with child maltreatment and early risk for youth violence. Previous research has described the importance of such factors as access to social capital, community social organization, economic and family resources, residential instability, and community and family violence. However, limited information exists about how these and other risk and protective factors might affect child maltreatment and youth violence. The results from this research will inform the development of violence prevention strategies for communities.

Addressing state surveillance of child maltreatment

Five state health departments are implementing mortality and morbidity surveillance for child maltreatment. California, Michigan, Minnesota, Missouri, and Rhode Island are comparing alternative approaches to state-level surveillance for fatal and nonfatal child maltreatment and are testing methods that may be used for the surveillance of violence at all ages. This program addresses the pressing need for a practical surveillance system for child maltreatment that can be implemented at the state level. It will also help determine the utility of various data sources, including data from hospitals, Child Protective Services, law enforcement, child fatality reviews, and medical examiner and coroner reports.

Developing uniform definitions and recommended data elements

CDC is developing uniform definitions and recommended data elements to improve and standardize data collected for child maltreatment surveillance. Without uniform definitions, different terms are used to describe acts of child maltreatment. These inconsistencies contribute to confusion and a lack of consensus about the magnitude of the problem. Consistent data allow researchers to better gauge the scope of the problem, identify high-risk groups, and monitor the effects of prevention programs. CDC is working with a diverse group of child maltreatment experts and five state health departments currently funded to conduct child maltreatment surveillance to develop uniform definitions. The definitions will be completed in fall 2006.

National Violent Death Reporting System

State and local agencies have detailed information from medical examiners, coroners, police, crime labs, and death certificates that could answer important, fundamental questions about trends and patterns of violence. However, the information is fragmented and difficult to access. CDC has funded 17 states to establish the National Violent Death Reporting System (NVDRS) to gather, share, and link state-level data about violence. Once implemented, NVDRS will enable CDC to compile vital, state-level information to better understand violence. NVDRS will help policy makers and community leaders make informed decisions about violence prevention strategies and programs, including those that address violence against children. NVDRS will also help gather more accurate and in-depth information about victims of child maltreatment and will establish standards for identifying abuse-related deaths.

Consequences of child sexual abuse

Research links child sexual abuse to a range of physical, sexual, reproductive, and psychological problems. Despite this evidence, efforts to prevent child sexual abuse are very limited. A systematic review of the consequences of child sexual abuse is underway to summarize findings from the scientific literature published since 1975. This review will show the links between sexual abuse and consequences, discuss how health care providers can respond, and introduce prevention concepts.

Practices to improve training skills of home visitors

CDC is funding the University of Colorado Health Sciences Center in Denver and the Johns Hopkins School of Medicine in Baltimore to examine two widely used home visiting programs. Home visiting has been reported as an effective strategy for preventing child maltreatment and other adverse child outcomes. However, the relative effectiveness of home visiting varies widely across different programs. Researchers will determine the impact of home visitor training and implementation factors on outcomes of child maltreatment and risk behaviors for youth violence.

Intervention for high-risk families

CDC is working on two projects with the University of Oklahoma's Center on Child Abuse and Neglect and the Oklahoma Department of Human Services. Researchers are:

- Evaluating a pilot program serving families and children at high risk of abuse and neglect, including, but not limited to, parents with drug- or alcohol-abuse problems, mental illness, mental or physical disability, or a history of intimate partner violence.
- Conducting a large-scale effectiveness trial of the Project SafeCare program. Project SafeCare provides home-based parenting and family preservation services to about 1,000 families in Oklahoma each year.

Review of parenting programs

CDC is reviewing the literature on the scope and efficacy of programs for parents with children from birth to 7 years of age. These programs provide parenting skills that enhance a child's well-being and adjustment. The review will identify common and specific components of parenting program content, mode of program delivery, dosage effect, strategies used for recruitment and retention, evaluation methodology, and results of outcome evaluations. When completed, results from the review will inform CDC's efforts to develop parenting approaches for child maltreatment prevention.

Parenting program attrition and compliance efficacy trial

Difficulties in engaging and retaining parents at risk for child maltreatment in prevention programs have been well documented. Even the most effective parenting programs have limited impact on child maltreatment if parents do not attend sessions or learn and apply alternative parenting skills. CDC is funding Purdue University in Indiana and the University of Oklahoma Health Sciences Center to test the role of different enhancements or service delivery methods for reducing attrition and improving emotional and cognitive engagement and behavioral compliance in an existing efficacious parenting program. Researchers are examining the impact of the strategies on parental attendance, attrition rates, compliance, behavior change, parent and child outcomes, and incidence of child maltreatment. Information about the cost of enhancements is being collected for later analyses.

Just the Facts . . .

Child Maltreatment

The Child Abuse Prevention and Treatment Act identifies four major types of maltreatment: physical abuse, neglect, sexual abuse, and emotional abuse.

- Physical abuse is to inflict a nonaccidental physical injury upon a child. This may include burning, hitting, punching, shaking, kicking, beating, or otherwise harming a child.
- Neglect is the failure to provide for a child's basic needs. Neglect can be physical or emotional.
- Sexual abuse is inappropriate adolescent or adult sexual behavior with a child.
- Other types of child abuse and neglect include emotional abuse and verbal abuse.

Multilevel parent training effectiveness trial

CDC is funding the University of South Carolina to examine the effectiveness of a multilevel intervention program. The Triple P–Positive Parenting Program is a parenting and family support strategy to prevent severe behavioral, emotional, and developmental problems among children by enhancing parents' knowledge, skills, and confidence. The project tests broad strategies aimed at preventing and reducing the risk of child maltreatment and promotes positive parenting to reduce stress and child behavior problems.

Assessment of cultural attitudes and beliefs about parenting practices

CDC has researched attitudes, beliefs, and behaviors among parents to identify regional, ethnic, and socioeconomic factors that influence parenting practices. Information was gathered via a literature review; focus groups; and individual interviews in Hispanic, Asian, African-American, Native-American, and Caucasian populations. The information gathered from this research could be used to inform the development of culturally appropriate messages for diverse audiences.

Collaborations to prevent child sexual assault

CDC is funding three state organizations—Prevent Child Abuse Georgia; Project Pathfinder, Inc., in Minnesota; and Massachusetts Citizens for Children—to develop and implement statewide child sexual abuse prevention programs. The programs will focus on adult or community responsibility in preventing the perpetration of child sexual assault. The funding supports projects using existing infrastructures to broaden prevention efforts.

Preventing Violence Through Education, Networking, and Technical Assistance

CDC is funding the University of North Carolina Injury Prevention Research Center to develop a national training program for violence prevention practitioners. PREVENT (Preventing Violence through Education, Networking, and Technical Assistance) is an outgrowth of the National Injury and Violence Prevention Training Initiative. It is supported by the Society for Advancement of Violence and Injury Research (formerly the National Association of Injury Control Research Centers) and the State and Territorial Injury Prevention Directors Association. PREVENT helps individuals and organizations build skills in identifying community needs and assets, creating and mobilizing partnerships, developing and implementing prevention programs, measuring success, and funding and sustaining programs. A variety of educational methods are used, including distance-learning modules, regional workshops, an intensive institute, action learning projects, and coaching.

BECAUSE Kids Count! (Building and Enhancing Community Alliances United for Safety and Empowerment)

CDC's BECAUSE Kids Count! program expands the capacity of national organizations and their state, local, and regional affiliates to effectively address the prevention of child maltreatment. CDC is funding the National Alliance of Children's Trust and Prevention Funds, Parents Anonymous, and Prevent Child Abuse America to expand their leadership roles in addressing the prevention of child maltreatment before it occurs; to foster collaborations that respond to emerging policy and program issues; to conduct assessments to determine organizational readiness; and to develop a plan to guide prevention activities.

Enhancing State Capacity to Address Child and Adolescent Health Through Violence Prevention

CDC's ESCAPe program is designed to develop capacity and leadership in preventing all types of violence toward or among children and adolescents, including child maltreatment. The planning and implementation phases of this project will address shared risk and protective factors for these forms of violence. Colorado, Iowa, Massachusetts, Michigan, Minnesota, New Mexico, Rhode Island, and Virginia have received funding.

Recommendations to help communities better serve the abused

CDC is partnering with other federal agencies to fund six community projects to implement recommendations from the National Council of Juvenile and Family Court Judges. These recommendations, published in *Effective Intervention in Domestic Violence and Child Maltreatment Cases: Guidelines for Policy and Practice* (called the "Green Book"), are designed to improve how the court system handles cases of abused women and children, to increase the effectiveness of the child protective system, and to enhance services for victims of domestic violence. Project goals include holding batterers accountable for their actions, increasing protection for victims of abuse, and decreasing the number of children who are removed from their non-abusive mothers.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to child maltreatment. Examples of extramural research projects follow:

- **Evaluation of a program to prevent abusive head trauma.** Researchers at the University of Maryland School of Medicine are evaluating the effectiveness of a hospital-based program to reduce the incidence of abusive head trauma in young children. The program educates postpartum parents about abusive head trauma and recommends ways to manage a crying infant and their own possible frustration. The researchers will also examine how maternal risk factors affect the risk for abusive head trauma.
- **Social support to enhance home visitation.** Researchers at the Columbia University School of Social Work are examining the effectiveness of an enhancement to home visitation services. Evidence suggests that social contextual factors, especially the social networks of parents, may play a substantial role in the effectiveness of home visiting programs to prevent maltreatment. Initial pilot work has yielded a promising intervention, which will be tested with 100 families. Data on physical child abuse and neglect risk, social networks, parents' sense of control, participation in home visitation, and other associated factors will be collected at baseline and at 3 and 9 months of age.

For more information about these and other projects, please visit www.cdc.gov/ncipc/res-opps/extra.htm.

Future Steps

The full extent of the child maltreatment problem in this country is not known. Current data systems only capture information about child maltreatment that is severe enough to come to the attention of the Child Protective Services system. As a result, many cases of child abuse go unreported and unnoticed. We must develop data collection and tracking systems at the local, state, and national levels to accurately document the scope of the problem and identify changes over time.

CDC is interested in preventing child maltreatment through programs that promote positive parent-child interactions and improve parenting skills. Such programs and policies may provide parents with skills to better manage behavior before violence can occur.

Many communities have implemented programs to prevent child maltreatment, but few programs have been evaluated for effectiveness. CDC's Injury Center is systematically reviewing these programs and creating a database of those that work. The database will include information about target populations, location, activities, evaluation methods, outcomes, and other details to help communities replicate successful programs.

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Child Passenger Safety

The Problem

Motor vehicle injuries are among the greatest public health problem facing U.S. children today. Motor vehicle injuries are the leading cause of death among children at every age after their first birthday (CDC 2005).

- In the United States during 2003, a total of 1,591 children ages 14 years and younger died as occupants in motor vehicle crashes, and approximately 220,000 were injured. That is an average of 4 deaths and 602 injuries each day (NHTSA 2004a).
- In 2002, more than half the children ages 14 and younger killed in motor vehicle crashes were riding unrestrained. Many of these injuries could have been prevented. Placing children in age-appropriate restraint systems reduces serious and fatal injuries by more than half (NHTSA 2004a).
- Children ages 12 years and younger should ride in the back seat, the safest place in a vehicle in the event of a crash. This is especially important for vehicles with front passenger airbags. Passengers riding in the back seat are at least 30% less likely to be injured (Braver et al. 1998).
- Drinking and driving are injury risk factors for child passengers. One in four occupant deaths among children ages 0 to 14 years involves a drinking driver. More than two thirds of these fatally injured children ride with the drinking drivers (Shults 2004).

CDC's Accomplishments

Interventions to increase child safety seat use

Over several years, scientists conducted a rigorous, systematic review of literature about community efforts to increase the use of child safety seats. They analyzed evaluations of those efforts and identified four interventions that were proven effective:

- Laws mandating the use of child safety seats (all 50 states currently have such laws);
- Stricter enforcement of those laws;
- Programs that distribute child safety seats and educate parents about proper use; and
- Programs that provide education about and incentives for child safety seat use.

These research findings were published in 2001 in CDC's *Morbidity and Mortality Weekly Report* and in a supplement of the *American Journal of Preventive Medicine*. In 2005, the findings were published in *The Guide to Community Preventive Services*, a publication of an independent task force. Also known as the *Community Guide*, it provides public health decision makers with recommendations about interventions to promote health and safety and to prevent disease, injury, disability, and premature death.

Drinking, driving, and child passenger safety

In a recent study, CDC scientists found that one in four occupant deaths among children ages 0 to 14 years involves a drinking driver. More than two thirds of these fatally injured children were riding with the drinking driver, and only 32% were restrained (Shults 2004).

A boost for children ages 4 to 8
CDC's Injury Center funded state health departments in Colorado, Kentucky, and New York to develop, implement, and evaluate community-based programs to increase booster seat use among children ages 4 to 8. Between 2000 and 2003, grantees implemented and evaluated community awareness campaigns and school-based programs, aired public service announcements, posted billboards, and conducted booster seat distribution events and car seat checkpoints. Evaluation data from Colorado showed a significant increase in booster seat use in target communities when compared with control communities. Results from these intervention evaluations will help guide future efforts to increase booster seat use.

Kids in the back for a safer ride
CDC's Injury Center funded the Center for Risk Analysis at the Harvard School of Public Health to develop, implement, and evaluate the "Kids in the Back/Niños Atrás" program in a low-income Hispanic community. This three-year, community-based intervention was designed to increase the number of children 12 and younger who ride properly restrained in the back seat of motor vehicles, the safest place for them. Project investigators organized a community task force, developed educational materials for parents and children in English and Spanish, implemented an incentive program to further motivate parents and children to adopt this behavior, coordinated 25 community events and safety seat checkpoints, and conducted a public information campaign targeting parents and caregivers of children. Researchers conducted pre- and post-intervention observational surveys of restraint use and seating position among children ages 12 years and younger in the intervention group and two control communities. During the intervention period, the percentage of children in the intervention community who were observed riding in the back seat increased from 33% to 49%.

CDC extramural research grants
CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to child passenger safety. A sample of those extramural research projects follows. For more information about these and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Dissemination of booster seat community intervention.** Researchers at Harborview Injury Prevention and Research Center at the University of Washington are using interviews and focus group studies to better understand behavioral barriers to booster seat use in high-risk Latino communities. Their findings will be used to develop a tailored community intervention. The effectiveness of the intervention will be assessed in a controlled community trial. Booster seat use and child passenger safety practices will be assessed through direct observation.
- **Boost 'em in the Back Seat: A Safe Ride Program.** Using risk communication guidelines, researchers at the Eastern Virginia Medical School are developing a five-minute video that includes crash test footage, portraying the power of crash forces and evoking high emotion by means of vivid imaging. The effectiveness of the video-based program in increasing booster seat use and rear seating will be tested at

Just the Facts . . .

Proper Restraint Using Booster Seats

Having outgrown child safety seats designed for younger passengers, children 4 to 8 years old frequently ride unrestrained or strapped in adult seat belts. Children in this age group should use belt-positioning booster seats until they are 4 feet, 9 inches tall (NHTSA 2004b, 2005). Belt-positioning booster seats raise a child's sitting height to fit a standard lap and shoulder belt. Public health and traffic safety organizations recommend that children in this age group be restrained properly in belt-positioning booster seats. However, among children in this age group who are restrained, only 37% ride in age-appropriate belt-positioning booster seats (Cody et al. 2002).

two large, representative preschool/daycare programs, using two similar control sites for comparison.

- **Childhood rear seating among the hard-to-reach.** The Education Development Center, Inc. and the Harvard Injury Control Research Center will disseminate a successful prevention strategy to increase child rear seating in a low-income, ethnically diverse community (Brockton, MA) with a substantial Cape Verdean (African) population. This project builds on the successful CDC-funded, community-based Niños Atrás program for Latino communities and will be led by the same research team. Using focus groups and key informant interviews, researchers will develop culturally appropriate materials and activities to be disseminated in collaboration with a community coalition. The dissemination strategy will place particular emphasis on ensuring that educational materials and strategies target populations hardest to reach, such as males; minority racial or ethnic groups (i.e., Cape Verdean, Haitian, and Hispanic); and low-income, low-literacy families. The primary outcome, child rear seating, will be assessed by observational study.

Future Steps

Although about 86% of children 14 years and younger use restraints, nearly one third use the wrong restraint for their size and age (Cody et al. 2002). CDC and its partners will work to get more communities to implement proven strategies that increase restraint use among children and to emphasize the importance of using the correct restraint for age and size. CDC has funded the state health departments of Colorado and Michigan to implement evidence-based interventions to increase booster seat use among children ages 4 to 8 years.

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Community Resilience

The Problem

In less than a decade, the United States has seen large-scale domestic terrorist attacks, coordinated violence against Americans abroad, increases in school shootings, and many catastrophic man-made and natural disasters. Such events have heightened awareness of child, family, and community mental health issues and the importance of resilient communities with resources to address the needs of residents during a crisis. Proactive leaders and concerned citizens in many locations have collaborated to develop emergency response plans; in some locations, exercises have been held to practice implementing these plans. Most plans focus on tangible issues like obtaining clean drinking water and food, providing shelter and clothing, and ensuring continuity of medical care and communication systems.

Disasters also have an emotional impact on communities. This includes feelings of anger, anxiety, confusion, depression, fear, grief, guilt, helplessness, and hopelessness; increased sense of insecurity; stigmatization; suspicion or mistrust of authority figures and organizations; and a greater perception of individual, community, and societal vulnerability.

In the absence of proper preparation, treatment, and follow-up, these psychosocial issues can lead to behavioral consequences such as increased alcohol and drug abuse; absenteeism and decreased job performance; higher rates of child maltreatment, youth violence, and speeding or erratic driving; avoidance of mass transportation; sexually transmitted health problems; intimate partner violence; and divorce. Although less common, some people also might experience anxiety attacks, stress-related disorders, and clinical depression.

Flag: Photo by Lauren Hobart/FEMA

Emotional consequences following traumatic events are not limited to the actual victims. Such events also affect families and friends of victims; public safety and health responders (police, firefighters, emergency medical technicians, doctors, nurses) and their families and friends; people who directly witnessed what happened or who watched detailed media coverage; people who narrowly missed being involved in the disaster; special populations (e.g., people with impaired mobility, people dependent on ventilators, frail elderly, people with physical or mental disabilities), and children.

CDC's Accomplishments

CDC is defining the science basis for a new field—community resilience—to address health protection strategies at the community level.

Summit explores community resilience

In 2004, CDC and the Terrorism and Disaster Branch of the National Center for Child Traumatic Stress sponsored a "Community Resilience Mini-Summit" in Oklahoma City. Professionals from key community service sectors such as schools, business, primary care, and families contributed papers. An executive summary has been created that defines and explores the concept of community resilience, recommends ways to develop resilience across different sectors of a community (e.g., public health, mental health, government, business), and describes how to sustain resilience. A guidebook for civic leaders is being developed to illustrate these findings.

Shovels: Photo by Andrea Booher/FEMA

Increasing agency training on resilience

CDC routinely trains agency professionals who respond to crises, including Epidemic Intelligence Service officers and Public Health Readiness team members. To increase the emphasis on psychosocial issues—enhancing the resilience not only of disaster victims but also of those deployed in response and recovery efforts—CDC has incorporated into this curriculum specific mental health competencies related to resilience.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to community resilience. A sample of those extramural research projects follows. For more information about these and other projects, please visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Psychological treatment of acute stress disorder following traumatic injury.** The Medical College of Wisconsin's Injury Research Center is examining the influence of subject, trauma, and injury variables on psychological well-being after injury. Their study focuses on causal attributions; self-efficacy; spiritual and religious values; and perceived level of social support, anger, and personal coping resources. Outcome data include measures of the intensity of posttraumatic stress disorder (PTSD) and depression symptoms. Changes in pre- and post-injury alcohol use will also be examined. Study results will inform early psychological intervention with trauma patients to prevent the development of long-term PTSD and depression symptoms.
- **Behavioral health effects of September 11, 2001.** Columbia University researchers are working to identify opportunities for primary and secondary prevention of terrorist- and disaster-related behavioral health disturbances by assessing the effects of the September 11, 2001, terrorist attacks on the health of New York City's communities. The study will determine whether there was an increase among vulnerable populations in emergency department and outpatient visits for stress-related conditions. The study will also examine whether such increases are associated with an adverse effect on the overall health of the community.

Habitat for Humanity: Photo by Kim MacDonald/Habitat for Humanity

Future Steps

While resilience among children has been studied for years, integrating and analyzing relevant thoughts, attitudes, and behaviors that contribute to and sustain resilience at the community level is a new endeavor. CDC is working with academic researchers and practitioners to develop tools to measure processes associated with community resilience. Such tools will help identify best practices across communities and enable the efficacy of interventions to be evaluated within the same community. CDC is collaborating with the National Center for Child Traumatic Stress to publish a special journal edition and a textbook devoted to community resilience with an emphasis on children and families.

CDC is researching community-related factors that contribute to the successful implementation of and adherence to movement restrictions mandated by public health (e.g., quarantine and isolation) for emerging infectious diseases. Findings from research about community resilience could enhance the effectiveness and efficiency of those projects.

Efforts are underway to identify common links between risk and protective factors related to community resilience and those of other key areas of activity for CDC's Injury Center such as reducing child maltreatment, youth violence, intimate partner and sexual violence, and suicidal behavior.

Emergency Preparedness and Response

The Problem

Despite the best efforts to protect the public, many Americans may be seriously injured in future mass casualty events such as large-scale natural disasters, disease outbreaks, or explosions. Survivors of these events may sustain unique types or combinations of injuries, such as blast lung (see page 52) or burns, which pose great challenges for medical management. The ability to effectively minimize the impact of such injuries will depend on all levels of the emergency medical response system to act appropriately, from individual providers and single treatment centers to regional networks of medical institutions. State and local public health systems also must be fully prepared and capable of responding to the public in the event of a mass casualty event.

More information is needed about the psychological, social, and behavioral ramifications of mass casualty events—especially terrorist attacks. Initiatives in these areas will provide vital information toward improving response preparedness at the community level. Community preparedness requires creative linkages between existing programs and initiatives (e.g., injury and violence prevention programs, victim assistance programs, and urban renewal projects). Improving collaboration among existing systems employed by social, civic, and faith-based organizations will help increase community preparedness and strengthen the public to manage the psychological and societal effects of mass casualty events.

CDC's Accomplishments

Educating the public, clinicians, and public health professionals

CDC has developed an emergency preparedness and response website: www.bt.cdc.gov/masscasualties/. This site provides information and tools to help the public, clinicians, and public health professionals prepare for and respond to mass casualty events. CDC has developed hospital capacity and injury severity predictor tools, an explosion primer for physicians, and fact sheets about the types of injuries one can expect during a mass casualty event. Additionally, this site includes response tools, fact sheets, and education messages about mental health needs and behavioral reactions, including those of children, following mass casualty events.

Partnerships to address psychosocial and behavioral aspects of mass casualty events

CDC's Injury Center has forged partnerships to address the psychosocial and behavioral effects of mass casualty events. Partners include other U.S. Department of Health and Human Services agencies (National Institute of Mental Health, the Substance Abuse and Mental Health Services Administration, and the Health Resources and Services Administration); the Department of Veterans Affairs' National Center for Posttraumatic Stress Disorder; the American Red Cross, the Department of Defense's Uniformed Services University of the Health Sciences; and university-based networks of public health and traumatic stress researchers and practitioners. To date, these partnerships have resulted in the development of a standardized needs-assessment module to identify informational, social service, medical, and mental health needs in affected communities. The partnerships have

also developed a standardized national surveillance module to assess trends in attitudes, preparedness behaviors, and reactions to terrorism.

To increase community resilience, the Injury Center works with the American Red Cross (ARC) to develop materials about psychosocial issues presented by post-disaster situations. Facilitated by a CDC cooperative agreement, ARC developed "Preparedness Today" at www.redcross.org/preparedness/cdc_english/CDC.asp. This website provides fact sheets and other materials that guide individual preparedness before an emergency, including emergency sheltering and quarantine. The site links to CDC's home page and is accessible via CDC's emergency preparedness Web pages: www.bt.cdc.gov.

Funding of TIIDE project to improve collaboration

In 2002, CDC began funding the Linkages cooperative agreement—now called Terrorism Injuries: Information, Dissemination and Exchange (TIIDE). The TIIDE project includes three interrelated areas: partnerships,

information dissemination, and lessons learned from terrorist events outside the United States. TIIDE partners are national nonprofit or for-profit professional organizations, with at least 25 members, that address acute care, trauma, or emergency medical services. The partnership establishes a foundation for effective collaboration and the exchange of information with the larger community of stakeholders. In July 2003, the National Association of Emergency Medicine Physicians, in partnership with CDC and other Linkages organizations, met in Washington, D.C., to determine how interactive information can be used to care for victims of a mass casualty event through an all-hazards approach. A summary of this meeting, "The Role of Interactive Information Systems for Responding to Events Resulting in Mass Injury," was published in the July 2004 issue of the *Journal of Prehospital Emergency Care*. CDC and its TIIDE partners have also developed a contact list to facilitate rapid communication among partners after a mass casualty event.

Studying the psychological aftermath of terrorist attacks

CDC has conducted research on the psychological and behavioral reactions to the 2001 terrorist attacks on the World Trade Center and the 2002 sniper attacks in the Washington, D.C., metropolitan area. Women who reported living within five miles of either incident were more likely to experience elevated traumatic stress symptoms than women living farther from the incidents. Among men, no significant association between residential proximity and elevated traumatic stress symptoms was reported. The study outcomes can help to inform future public health interventions for terrorist events. Additionally, CDC personnel have served on the National Advisory Committee on Children and Terrorism.

World Trade Center Evacuation Study yields strategies for risk reduction

CDC supports research at the Columbia University Mailman School of Public Health to identify the individual, organizational, and environmental (building) factors that affected evacuation of the World Trade Center (WTC) on September 11, 2001. During focus groups and qualitative interviews (phase I), WTC evacuees were asked about individual, organizational, and environmental factors that facilitated or posed barriers to evacuation or influenced their decisions to evacuate. Their decision process to evacuate included: perceived ability to walk down multiple flights of stairs; previous experience evacuating a WTC tower; concern over leaving the workplace; workplace preparedness planning and training; structural damage; heavy congestion on certain stairways; and lack of back-up communication. These data provide insights into preparedness planning for evacuating multistory buildings. Results from the qualitative research were published in the September 10, 2004, issue of *Morbidity and Mortality Weekly Report*. Detailed quantitative information on how these factors affected evacuation behaviors, and how these behaviors affected evacuation time, was collected from more than 1,400 evacuees. Findings of this study will provide information for groups such as builders, developers, insurance companies, employee organizations, fire prevention specialists, and emergency planners about risk reduction strategies related to the evacuation of high-rise buildings.

Photo courtesy of *Chest*, 1999

Blast lung injury (BLI) is a direct consequence of pressure upon the body from high-explosive detonations. Because lungs are fragile and sensitive to overpressure, the force from an explosion can cause tearing, hemorrhage, contusion, and edema due to the inappropriate distribution of fluids and oxygen. BLI, a clinical diagnosis characterized by respiratory difficulty and hypoxia, can occur without obvious external injury to the chest. BLI presents unique triage, diagnostic, and management challenges and is a major cause of morbidity and mortality for blast victims at the scene—particularly the initial survivors.

Fire evacuation data collection tools

CDC has developed protocols and data collection instruments for an epidemiologic field investigation for a large-scale fire and evacuation that could occur in a crowded public building. These materials may be adapted for similar incidents that occur in the future.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to emergency preparedness and response. Some examples of these extramural research projects follow. For more information about these and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Needs assessment of emergency preparedness and response activities in California schools.** The Southern California Injury Prevention Research Center, part of UCLA's School of Public Health, is conducting a pilot study of public schools' emergency preparedness in 12 school districts in Los Angeles County. The pilot study will inform a larger needs assessment of emergency preparedness for schools in the state's 100 school districts. The study will describe the types of emergencies that occur in schools; describe the intended (written) and actual emergency preparedness activities that exist in schools; identify the types, methods, and perceived adequacy and inadequacy of training provided to school staff; and examine differences in perceived and actual preparedness across school districts.
- **Identifying and treating post-traumatic stress disorder symptoms resulting from traumatic injuries among children.** This project, conducted by the University of California, San Francisco, will clarify the relationship between childhood posttraumatic stress disorder (PTSD) and potential impairment in social, academic, and psychological functioning. The project will also evaluate a novel combination of treatment interventions, which researchers hypothesize could effectively reduce PTSD symptoms for hospitalized children and for large numbers of children requiring immediate treatment after natural disasters, school shootings, or other catastrophic events.

Future Steps

TIIDE-funded partners are engaged in several CDC initiatives that address acute care and the health consequences of terrorism-related events. Future activities include developing a field triage protocol for mass casualty events, developing clinical primers and blast injury training for health care professionals, and translating injury care from the military to the civilian sector. The TIIDE project will enhance CDC's ability to work with the emergency care

Just the Facts . . .

How Mass Casualty Events Affect Health

During a mass casualty event, people can be physically injured and may have limited access to medical care and vital services. People can also suffer emotional and physical stress after a mass casualty event, even if they are not near the scene.

This additional stress can worsen existing health conditions (e.g., diabetes) or trigger a new health problem (e.g., heart attack or depression).

If a mass casualty event occurs, anyone who is injured or suspects injury should seek medical care immediately. Everyone is encouraged to resume personal care:

- Maintain healthy eating, exercise, and sleeping habits;
- Continue to take medicine as prescribed by physicians;
- Maintain daily routines; and
- Talk to others about their feelings and concerns.

community and will ensure that critical information is accessible and effectively communicated to a broad spectrum of health care providers and organizations before, during, and after a terrorist event.

Past mass casualty events indicate that medical resources could be depleted in the aftermath of an event. This depletion could be caused by a surge of persons seeking care during a brief period following the catastrophic event. Currently, limited strategies are in place to deal with a sudden surge of injuries at a ground zero hospital. These hospitals, although affected unequally, would be overrun. CDC is addressing this problem by seeking creative solutions to match resources to need and by identifying rapid, accurate triage methods for treating large numbers of patients with multiple injuries of varying severity. CDC will use a wide spectrum of communication channels to share its findings.

Equally important, CDC plans to develop a mechanism for conducting timely and rapid field epidemiological investigations on evacuation procedures. Incidents necessitating evacuation could include wildfires or fires in large public structures such as high-rise apartments or commercial buildings. Previously developed data collection instruments and protocols could easily be adapted to address hypotheses regarding psychological and behavioral effects. Study questions that can only be answered by rapid collection of field data may address pre- and post-evacuation expectations, preparedness, practice, prior experience, and decision-making strategies.

Much has yet to be learned about the effects of mass casualty events on one's thoughts, behaviors, and emotions. To help increase awareness and understanding of these issues, CDC plans to complete the following tasks and initiatives:

- Conduct further research leading to a course of action that will help prevent or lessen the psychosocial and behavioral consequences of movement restrictions (e.g., quarantine and isolation) imposed to control the transmission of a communicable disease epidemic.
- Assist state health departments in addressing the psychosocial issues of the general public and special populations (e.g., children, disabled persons, persons with mental illness) to build more resilient communities.
- Develop data collection instruments for use during emergency events to evaluate fear as a contagion in emerging infectious diseases (such as SARS) and to identify the impact on critical workforce behavior and infrastructure during such outbreaks.
- Develop demonstration projects and evaluate best practices for building community resilience, the ability of a community to adapt to unexpected events and stressful situations (e.g., natural disasters and terrorist attacks).

Intimate Partner Violence

The Problem

- Approximately 1.5 million women and 834,700 men are raped or physically assaulted by an intimate partner each year in the United States, according to the National Violence Against Women Survey (Tjaden and Thoennes 2000).
- Nearly two thirds of women who report being raped, physically assaulted, or stalked since age 18 were victimized by a current or former husband, cohabiting partner, boyfriend, or date; in 8 of 10 rape cases, the victim knew the perpetrator (Tjaden and Thoennes 2000).
- More women than men experience intimate partner violence (IPV). According to the National Violence Against Women Survey, 1 in 4 U.S. women has been physically assaulted or raped by an intimate partner; 1 in 14 U.S. men reported such an experience (Tjaden and Thoennes 2000).
- Among women who are physically assaulted or raped by an intimate partner, 1 in 3 is injured. Each year, more than 500,000 women injured as a result of IPV require medical treatment (Tjaden and Thoennes 2000).
- Intimate partner violence is associated with both short- and long-term problems, including physical injury and illness, psychological symptoms, economic costs, and death (National Research Council 1996).
- Each year, thousands of American children witness IPV within their families. Witnessing violence is a risk factor for long-term physical and mental health problems, including alcohol and substance abuse, being a victim of abuse, and perpetrating IPV (Felitti et al. 1998).
- The health care cost of intimate partner rape, physical assault, and stalking exceed $5.8 billion each year, nearly $4.1 billion of which is for direct medical and mental health care services (CDC 2003).

Intimate partner violence (IPV) is actual or threatened physical or sexual violence or psychological and emotional abuse directed toward a spouse, ex-spouse, current or former boyfriend or girlfriend, or current or former dating partner. Intimate partners may be heterosexual or of the same sex.

CDC's Accomplishments

Developing uniform definitions and recommended data elements

In 1999, CDC published *Intimate Partner Violence Surveillance: Uniform Definitions and Recommended Data Elements* to improve and standardize data collected about intimate partner violence. Similar standards for sexual violence, *Sexual Violence Surveillance: Uniform Definitions and Recommended Data Elements,* were published in 2002. Uniform definitions and recommended data elements for IPV and sexual violence provide consistency in the use of terminology and standardization in data collection. Without these standards, researchers have used varying terms to describe acts of violence. These inconsistencies have contributed to confusion and a lack of consensus about the magnitude of the problem. Consistent data allow researchers to better gauge the scope of the problem, identify high-risk groups, and monitor the effects of prevention programs.

Measuring the incidence and prevalence of intimate partner violence and sexual violence

With external partners, CDC has developed two surveys to help states better assess the problem of IPV, sexual violence, and resulting injuries. The surveys are available as optional modules in the CDC Behavioral Risk Factor Surveillance System. In addition to providing data on the incidence and prevalence of the problem, these surveys will provide knowledge of the related attitudes and norms that allow violence to occur. Data may also be used to compare statistics across states, assess the impact of programs, and guide policy development.

Developing state-based surveillance systems

CDC funded activities in three states to help monitor and track IPV. These activities helped states identify existing data sources, recognize opportunities to link data sources, and develop and implement more comprehensive systems for monitoring and tracking the problem. Michigan, Minnesota, and Oregon are improving state injury surveillance capacity by implementing the *Consensus Recommendations for Injury Surveillance in State Health Departments*, issued in September 1999. The states supported the integration of intimate partner violence surveillance systems into existing injury surveillance systems and are continuing to revise and test uniform definitions and data elements.

Reporting system to provide objective, timely violence data

State and local agencies have detailed information from medical examiners, coroners, police, crime labs, and death certificates that could answer important, fundamental questions about trends and patterns in violence. However, the information is fragmented and difficult to access. CDC has funded 17 states—Alaska, California, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wisconsin—to establish the National Violent Death Reporting System (NVDRS) to gather, share, and link state-level data about violence. When fully implemented, NVDRS will enable CDC to pull together vital state-level information to gain a more accurate understanding of violence and will enable policy makers and community leaders to make informed decisions about violence prevention strategies and programs, including those that address IPV.

Assessing links between various forms of violence

CDC is conducting a study to identify the links between different forms of violent behaviors among adolescents. The findings will help scientists understand the prevalence and consequences of different types of aggressive behaviors; the association between dating violence and other forms of peer violence; and the manner in which these types of violent behavior vary by sex, developmental stage, and other factors.

Intimate partner violence perpetration behavior study

CDC is conducting a study to assess how issues of power and control contribute to the development of perpetrator behavior. Study results will help scientists determine the best way to address issues of power and control in prevention and intervention strategies. Information is being collected from court-mandated male perpetrators and controls from the same community to identify characteristics that lead to perpetration.

Culturally-competent demonstration projects

CDC funds 10 projects to prevent IPV and sexual violence among various racial and ethnic populations, including African Americans, American Indians and

Alaska Natives, Hispanic Americans, and Asian Americans and Pacific Islanders. These projects have developed and are evaluating programs for children, victims, and perpetrators; programs to prevent dating violence among school-aged youth; and programs that link victims with community-based service providers. The components and outcomes of interest vary by project.

Violence Against Women Evaluation Guide

CDC developed the *Violence Against Women Evaluation Guide* to help programs develop and implement outcome evaluations. The guide will assist programs in selecting useful, feasible, ethical, and accurate evaluation strategies. It clearly defines evaluation research based on CDC guidelines and provides an overview of issues to consider when evaluating programs that address violence against women. Information about data collection methodology and measures, data analyses, presentation of results, and selection of an external evaluator will be included. The guide is scheduled for release in 2006.

Using social networks to prevent violence against women

CDC is studying how friends, relatives, and acquaintances can influence the behavior of men and women in abusive situations and how social networks can be used to prevent violence against women. Researchers conducted interviews with women in shelters and support groups to identify who helped them make decisions or assisted them in leaving abusive situations. Men in batterer intervention programs were asked how friends, relatives, and acquaintances influenced their partner violence attitudes and behaviors. Results from the study will help direct prevention messages to people in the best position to assist women and men in preventing partner violence and changing the norms that lead to acceptance of violence.

CHOOSE RESPECT campaign aims to prevent intimate partner and sexual violence

CHOOSE RESPECT is a communications campaign that encourages adolescents to develop positive, respectful relationship behaviors. The campaign is designed to reach 11- to 14-year-olds and the caring adults in their lives with prevention messages about choosing respectful, positive relationship behaviors before norms and attitudes that support violence against women are firmly established. Campaign elements include a website, an interactive music video maker, an education video, brochures, posters, cinema slides, and radio and TV spots. The campaign was launched May 2006.

Domestic Violence Prevention Enhancement and Leadership Through Alliances

CDC is funding 14 state domestic violence coalitions to develop and implement prevention activities that can be integrated into Coordinated Community Responses (CCRs) or similar community-based collaborations. The Domestic Violence Prevention Enhancement and Leadership Through Alliances (DELTA) program is adding a significant prevention focus to the existing CCR model by funding state domestic violence coalitions who provide prevention-focused technical assistance, training, and funding to local communities.

Assessment tools for measuring intimate partner violence

CDC has developed *Measuring Intimate Partner Violence Victimization and Perpetration: A Compendium of Assessment Tools.* The compendium will provide researchers and prevention specialists with a set of assessment tools with demonstrated reliability and validity for measuring the self-reported incidence and prevalence of IPV and perpetration. The compendium will be available late 2006.

Recommendations to help communities better serve the abused

CDC is partnering with other federal agencies to fund six community projects to implement recommendations from the National Council of Juvenile and Family Court Judges. These recommendations, published in *Effective Intervention in Domestic Violence and Child Maltreatment Cases: Guidelines for Policy and Practice* (called the "Green Book"), are designed to improve the way the court system handles cases of abused women and children. The recommendations are also designed to increase the effectiveness of the child protective system and to enhance services for victims of IPV. Project goals include holding batterers accountable for their actions, increasing protection for victims of abuse, and decreasing the number of children who are removed from their non-abusive mothers.

Evaluation assistance for projects to prevent first-time male perpetration of sexual violence

CDC has provided evaluation assistance to four projects designed to prevent first-time perpetration of sexual violence by males. Designed to help the programs build capacity to conduct their own evaluations, the key elements CDC provides are training and coaching on the use of evaluation concepts, techniques, and findings to foster program improvement.

Rape Prevention and Education program

CDC administers the Rape Prevention and Education (RPE) program and provides technical assistance to health departments, sexual assault coalitions, partner organizations, and other agencies. The RPE program supports educational seminars, hotline operations, training programs for professionals, informational materials, and other efforts to increase awareness of sexual violence, including that perpetrated by intimate partners. Through this program, states and territories have implemented prevention and education programs and developed a stronger infrastructure to address sexual violence.

Rape Prevention and Education program evaluability assessment

To enhance the administration and use of the Rape Prevention and Education (RPE) funding, CDC assessed how states allocate funds and the types of activities the funds support. The primary objectives of this study were to document the goals and objectives of the RPE program as it relates to the activities of state health departments and sexual assault coalitions; to assess the allocation mechanisms, uses, and impact of the funds; and to assess the public health needs of states and local programs in terms of knowledge, skills, resources, and barriers to effective implementation.

Preventing Violence through Education, Networking, and Technical Assistance

CDC is funding the University of North Carolina Injury Prevention Research Center to develop a national training program for violence prevention practitioners. The initiative, known as PREVENT (Preventing Violence through Education, Networking, and Technical Assistance), is an outgrowth of the National Injury and Violence Prevention Training Initiative and is supported by the Society for Advancement of Violence and Injury Research (formerly the National Association of Injury Control Research Centers) and the State and Territorial Injury Prevention Directors Association. PREVENT helps individuals and organizations build skills for identifying community needs and assets, creating and mobilizing partnerships, developing and implementing prevention programs, measuring success, and funding and sustaining programs. PREVENT uses various educational methods including distance-learning modules, regional workshops, an intensive institute, action learning projects, and coaching.

National Sexual Violence Resource Center

The National Sexual Violence Resource Center (NSVRC) provides information, resources, and research on all aspects of sexual violence, including intimate partner sexual violence. The NSVRC collects, reviews, catalogs, and disseminates information about sexual violence prevention and intervention; coordinates efforts with other organizations; provides technical assistance and customized information; and maintains a website. The website links to sexual assault resources and information about upcoming conferences, funding opportunities, job announcements, research, and special events. The NSVRC also produces a biannual newsletter, recommends speakers for conferences, coordinates national sexual assault awareness activities, and identifies emerging policy issues and research needs. Further, the NSVRC serves coalitions, local rape crisis centers, government and tribal entities, colleges and universities, service providers, researchers, allied organizations, policy makers, and the general public. Additional information can be found online at www.nsvrc.org.

National online resources for violence against women

CDC has funded the Pennsylvania Coalition Against Domestic Violence (PCADV) and the California Coalition Against Sexual Assault's (CALCASA) Prevention Connection to provide national, online resources for preventing violence against women. These resources will support local, state, national, and tribal agencies and organizations in developing, implementing, and evaluating prevention and intervention programs for violence against women. For more information, visit www.vawnet.org and www.preventconnect.org.

CDC-funded research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study factors related to IPV. For information about CDC's extramural research projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

Some examples of CDC-funded grants follow:

- **Effects of formal danger assessment on actions to prevent women from partner violence.** Researchers at the Johns Hopkins University School of Public Health are assessing whether using a standardized, empirically based tool to generate and

communicate scores reflecting the level of danger a victim of IPV faces will lead to more or less protective actions taken by the victim and the courts. In addition to educating IPV victims about the dangers they face and effective strategies for preventing further violence, legal advocates will use danger score information in communications with judges and prosecutors to influence legal decisions relevant to victim safety.

- **Piloting a family-based program for preventing adolescent dating violence.** Researchers of the University of North Carolina at Chapel Hill are developing and pilot testing Families for Safe Dates, a family-based program to address multiple types of youth violence, including dating violence (psychological, physical, and sexual), victimization and perpetration, and violence directed at peers. The content of Families for Safe Dates will draw heavily from Safe Dates, an effective school-based program to prevent dating violence. The premise and structure will model the Family Matters program, a program that successfully reduced the prevalence of adolescent substance use.
- **Examining partner violence perpetration among men.** Harvard School of Public Health researchers are conducting a mixed-methods retrospective cohort study of men ages 18 to 35 living within racially and ethically diverse neighborhoods in the Boston area. Men in this age group perpetrate IPV at the highest rates. The study will assess risk and protective factors for perpetration of IPV. Researchers also will assess interrelations of IPV perpetration and perpetration of other forms of violence (i.e., suicide, sexual violence, child maltreatment, general violence). Finally, researchers will assess the relevance of findings regarding risk and protective factors for IPV perpetration and compare with findings for the population of men enrolled in treatment programs from these same communities.

Future Steps

The full extent of nonfatal and fatal intimate partner violence (IPV) in the United States is not known. To better document the scope of the problem and identify trends in incidence and prevalence, the quality of data collection at national, state, and local levels must be improved.

Scientists, public health professionals, advocates, and others in the field must increase efforts to stop IPV from occurring. To this end, CDC will fulfill its public health responsibilities by evaluating interventions for IPV prevention and communicating sound, science-based recommendations about programs and practices that work.

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Older Adult Drivers

The Problem

In 2002, a total of 7,688 people ages 65 and older died in motor vehicle crashes in the United States (CDC 2005).

- Drivers ages 65 and older have higher crash death rates per mile driven than all but teen drivers (NHTSA 2004).
- Rates for motor vehicle-related injury are twice as high for older men as for older women (Stevens et al. 1999).
- Motor vehicle-related deaths and injuries among older adults are rising. During 1990–1997, the number of deaths rose 14%, and the number of nonfatal injuries climbed 19% (Stevens et al. 1999).
- The 65-and-older age group is the fastest growing segment of the U.S. population. Estimates indicate that more than 40 million older adults will be licensed drivers by 2020 (Dellinger et al. 2002).

CDC's Accomplishments

Why older adults stop driving

Scientists at CDC's Injury Center worked with the University of California, San Diego, to survey older drivers living in community settings about why they stop driving. The most common reasons for stopping were medical conditions—frequently, poor vision. This research provides useful insight into why older drivers decide that they are no longer fit to drive, which can help public health practitioners develop programs to reduce motor vehicle-related injuries in this population. These findings were published in 2001 in the *Journal of the American Geriatrics Society.*

Older drivers are less likely than younger drivers to kill others in a crash

CDC researchers analyzed fatality data to determine whether older drivers were more likely than younger drivers to be involved in crashes that killed someone else. They found that, in fact, older drivers were involved in fewer of these crashes than were drivers 16 to 34 years old. This study helps dispel the myth that older drivers present an unacceptable threat to others on the road. Study findings were published in 2004 in the *American Journal of Preventive Medicine.*

Fatal crashes among older drivers

CDC researchers analyzed fatal crash involvement rates for drivers ages 65 years and older. They assessed how the crash fatality rate (risk of death), incidence density (risk of crash), and exposure prevalence (amount of driving) contributed to the fatal crash involvement rates of older drivers. The crash fatality rates and the incidence densities increased with age, while the exposure prevalence decreased. In other words, although older drivers drove less, they were more likely to crash and to die in a crash. These findings suggest that older driver crash deaths can be reduced by decreasing their crash risk, their risk of injury when a crash occurs, or by decreasing the amount they drive. Research findings were published in 2002 in the *American Journal of Epidemiology.*

License renewal and crash risk among older drivers

With CDC funding, researchers at the University of Washington are investigating the relationship between older drivers' crash risk and the time since their last license renewal. The interval between license renewals is an issue of public policy, and states must balance the crash risk caused by drivers who have become impaired against the cost and inconvenience of more frequent renewals. The results of this study will help decision makers determine the appropriate interval between license renewals for older drivers.

Race and sex disparities in motor vehicle-related deaths among older adults

CDC researchers analyzed annual mortality data to identify differences in motor vehicle-related death rates among adults 65 and older by sex, race, and ethnicity. From 1990 to 1998, motor vehicle-related death rates were highest among Native-American and African-American men, while women's rates were highest among Native Americans and Asian/Pacific Islanders. These findings of racial- and sex-related disparities, published in the journal *Injury Prevention* in 2002, will be useful for identifying high-risk groups and for developing prevention strategies that target them (Stevens and Dellinger 2002).

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to older adult drivers. A sample of those extramural research projects follows. For more information about these and other projects, please visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Policies for older driver safety: evaluation of older driver policies and practices in other countries.** Other countries, especially developed nations with high numbers of licensed drivers and advanced highway systems, face many of the same issues as the United States concerning older drivers. Researchers at the Johns Hopkins Bloomberg School of Public Health are systematically reviewing other nations' policies, programs, and practices for older drivers to assess applicability in the United States. This research will examine whether a policy of staged licensing curtailment for older drivers—analogous to graduated licensing for younger drivers—would be appropriate and effective. Based on findings, researchers will develop and widely disseminate policy recommendations.
- **Reducing older driver injuries at intersections.** Data from other countries have shown that roundabouts dramatically improve traffic conflicts and overall safety at intersections. But in the United States, subjective data show that drivers, especially older drivers, fear what they perceive to be elevated demands and risks associated with roundabouts, and they may avoid their use. Researchers at the Texas A&M Research Foundation (part of Texas A&M University) explored the development of more elder-friendly designs for roundabouts. The results, reported in June 2005, informed recommendations for developing new guidelines for modern roundabouts, where the overall goal was to foster the use of these facilities by the groups most at risk of injury in intersection crashes, including older adults.

Future Steps

Basic questions remain unanswered. CDC must work with a variety of partners—for example, clinicians, advocacy groups, transportation experts, and older drivers themselves—to determine under what conditions older adults *choose* to stop driving and under what conditions they *should* stop driving. Issues to consider include:

- How medical conditions increase the risk of a crash;
- How much older adults drive and what their transportation needs are;
- Why older adults decide to stop driving;
- Whether they stop driving at the appropriate time and for the right reasons;
- Whether screening tests can successfully identify high-risk older drivers;
- How to practically measure older adults' functional ability to drive; and
- Alternatives to driving that would be both practical and acceptable to older adults.

This information will enable policy makers and public health practitioners to make informed decisions and develop effective strategies to reduce the number of injuries and deaths among this age group.

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Older Adult Falls

The Problem

- More than one third of adults 65 years or older fall every year (Hornbrook et al. 1994; Hausdorff et al. 2001); both falls and fall injury rates increase sharply with age (CDC 2001).
- Among seniors, falls are the ninth leading cause of death and the leading cause of fatal and nonfatal injuries (CDC 2005).
- In 2002, 12,800 older adult deaths were caused by falls (CDC 2005).
- Falls are the most common cause of nonfatal injuries and of hospital admissions for trauma (Alexander et al. 1992).
- Between 20% and 30% of falls cause moderate to severe injuries that reduce mobility and independence and increase the risk of premature death (Alexander et al. 1992; Sterling et al. 2001).
- In 2002, 1.64 million persons visited hospital emergency departments for nonfatal injuries; 388,000 of those treated were hospitalized (CDC 2005).
- Most fractures are caused by falls (Bell et al. 2000), and the most serious type is hip fracture. Up to 20% of hip fracture patients die within a year (Liebson et al. 2002), and those who survive often experience significant disability and reduced quality of life (Wolinsky et al. 1997; Hall et al. 2000).
- In 2001, about 327,000 hospital admissions were for hip fracture; 76% were among women (CDC 2001).
- In 1994, fall injuries totaled $27.3 billion. By 2020, the cost of these injuries is projected to reach $43.8 billion (figures adjusted for inflation; Englander et al. 1996).

CDC's Accomplishments

Falls prevention materials

In 1999, CDC's Injury Center published the *Tool Kit to Prevent Senior Falls.* It contained fact sheets and health education materials (brochure and home safety checklist) aimed at reducing falls and related injuries among older adults. In 2001, Spanish versions of the brochure and checklist were made available. More than 6,000 organizations used the *Tool Kit* in fall prevention programs. Materials were distributed to senior centers, hospitals, and health departments. Materials were also incorporated into professional presentations and instruction for nursing and other health care students. Although the *Tool Kit* is no longer available as a complete package, individual pieces (available in English, Spanish, and Chinese) have been updated and can be ordered at no cost or downloaded from www.cdc.gov/ncipc/pub-res/toolkit/brochures.htm.

Dane County Safety Assessment For Elders (SAFE) research study

In October 2002, CDC funded the Wisconsin Department of Health, in collaboration with the University of Wisconsin, to conduct a randomized controlled trial to assess the effectiveness of a comprehensive approach to preventing falls among community-dwelling, higher-risk adults ages 65 and older. It uses two complementary strategies: a comprehensive at-home assessment followed by individualized risk reduction and a broad-based program to educate primary care physicians and other health practitioners. The study began in late October 2003; 352 participants have been enrolled to date, and 62 have completed their one-year enrollment period.

No More Falls! study

In October 2001, CDC funded the California State Health Department to conduct a randomized controlled multicomponent fall-prevention study for older adults. The study integrates fall prevention into the Preventive Health Care for the Aging (PHCA) program, a community-based public health program for older adults. The study, which had about 500 participants, was implemented in PHCA clinics in San Diego and Humboldt counties. The intervention included four elements: education about fall risk factors, referrals to community exercise programs to increase strength and balance, medication review, and home modification to reduce home hazards. The study was completed in 2004 and these data are now being analyzed.

National Resource Center on Safe Aging

In 1998, CDC funded the San Diego State University Foundation and the University Center on Aging at San Diego State University to develop a national resource center. The Resource Center's mission is to gather and share the best information and resources on injury prevention and senior safety, including pedestrian and motor vehicle safety and the prevention of falls and elder abuse. Information can be obtained at ~~www.safeaging.org~~.

Program to prevent fire- and fall-related deaths among older adults

In October 2000, CDC began funding state health departments in Arkansas, Maryland, Minnesota, North Carolina, and Virginia to implement and evaluate a program to teach older adults how to prevent fires and falls. Remembering When: A Fire and Fall Prevention Program for Older Adults is a curriculum developed by the National Fire Protection Association, CDC, and other partners. It uses lesson plans, brochures, fact sheets, game cards, and other educational

materials to present 16 life-saving lessons. This program is the first of its kind to combine education about fire- and fall-related injury prevention among older adults and is one of the few off-the-shelf programs of its type available to communities. To date, 382 group presentations and 457 individual presentations have been conducted; 3,245 smoke alarms have been installed.

In August 2002, CDC and Georgia State University began evaluating the effectiveness of the Remembering When program to assess the knowledge and skills needed to reduce falls and fires. Preliminary data show significant gains in knowledge on space heaters, safe clothing, and fall reduction in bathtubs. The home assessment showed an increase in the use of bath mats, night lights, and working smoke alarms. Manuscripts are currently being written, including recommendations for dissemination.

Estimating the health care costs of older adult fall-related injuries

In 2003, North Carolina's Research Triangle Institute was awarded a contract to estimate the direct medical cost of fall-related injuries among U.S. adults ages 65 and older for 2000. Estimates for fatal falls were derived from directly measured acute care costs plus nursing home costs for those who survived beyond hospital discharge. Nonfatal fall injuries were identified using claims data for about 4 million Medicare enrollees. The claims contained detailed payment information for all covered services (hospital inpatient, outpatient, skilled nursing, home health, hospice, physicians/supplier services, and durable medical equipment).

Falls Free: Promoting a national action plan to prevent falls among older adults

Because falls are recognized as a major public health problem, the National Council on Aging (NCOA), in collaboration with CDC and with funding from The Archstone Foundation and the Home Safety Council, spearheaded an initiative titled Falls Free: Promoting a National Falls Prevention Action Plan. The initiative, which provides strategic input into the development of a national blueprint to prevent older adult falls, was released at the American Society on Aging-NCOA Conference in March 2005 (visit www.healthyagingprograms.org).

Healthy Aging Prevention of Falls project

In October 2001, CDC's Injury Center and the National Center for Chronic Disease Prevention and Health Promotion funded the National Safety Council (NSC) to conduct a series of 8 to 10 focus groups in urban and rural settings. Information will be gathered from seniors, caregivers, and health care providers about their knowledge and attitudes about safety. The focus groups will also be asked about two Injury Center brochures on fall prevention. From these findings, the NSC will create and test three brochures for seniors, families and caregivers, and medical and other senior service providers.

Just the Facts . . .

Falls and Prevention

- The most effective fall intervention strategy is a comprehensive clinical assessment combined with individualized fall risk reduction and patient follow-up (Rand 2003).
- Environmental risk factors in and around the home (i.e., tripping hazards, lack of stair railings, or poor lighting) can increase fall risk (Northridge et al. 1995; Connell 1996, Gill et al. 1999). Improve home safety by installing handrails on both sides of stairs; installing grab bars next to the toilet and in the tub or shower; removing tripping hazards such as throw rugs and clutter; and using nonslip mats in the bathtub and on shower floors.
- Poor vision increases the risk of falling (Lord and Dayhew 2001). At least once a year, seniors should have an eye doctor check their vision and correct it as much as possible.

- Psychoactive medications such as tranquilizers, sleeping pills, and antianxiety drugs can make a person more likely to fall (Ray and Griffin 1990). Having a doctor or pharmacist review prescription and over-the-counter medicines can reduce side effects and interactions.
- Muscle weakness, gait, and balance problems increase the risk of falling (Graafmans et al. 1996; American Geriatrics Society 2001). Exercise is an effective prevention strategy to improve leg strength and balance (Rand 2003). Tai Chi is one example of this type of exercise (Wolf et al. 1996).

CDC extramural research grants
CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to falls among older adults. Examples of those extramural research projects follow. For more information about these and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Understanding factors that influence hip protector use among community-dwelling seniors.** CDC funds researchers at the University of North Carolina Injury Prevention Research Center to evaluate the acceptability of hip protectors among community-dwelling seniors. Researchers seek to identify perceived barriers, promote acceptability, and encourage hip protector use.

  The researchers will identify a sample of community-dwelling older adults and explore their reactions and attitudes to hip protectors using a combination of focus group and interview strategies. Another group of participants will be interviewed and then provided with three pairs of hip protectors, instructed in their use, and asked to wear them for one week. Participants will be interviewed again after one week to find out their attitudes toward various aspects of the hip protectors (i.e., ease of use, comfort and fit, ease of care) and their physical difficulties or illnesses. Follow-up data will be collected about adherence, falls that may have occurred, and whether hip protectors were being worn at the time of the fall. This process will be repeated four times with different types of hip protectors.

- **Preventing falls through enhanced pharmaceutical care.** Researchers at the University of North Carolina at Chapel Hill evaluated the effectiveness of a community-based fall-prevention program delivered by community pharmacists. The target population comprised community-dwelling older adults ages 65 and older who had fallen within the past year, had used four or more prescription medications, or had used at least one medication that acts on the central nervous system. A community pharmacist consulted the intervention group about their current medications. The control group was given a series of monthly informational materials about prevention and treatment of health problems associated with aging (e.g., osteoporosis, heart disease) and lifestyle behaviors important for health maintenance (e.g., exercise). All individuals were followed for one year. Data about falls were collected via monthly falls calendars.

Future Steps

Fall injuries place an enormous burden on individuals, society, and the health care system. Because the U.S. population is aging, this problem will worsen unless we take preventive action. Even though much is known about effective fall prevention strategies, these strategies need to be refined, implemented, disseminated, and promoted—especially at the local level. Further research would also help tailor interventions for populations with differing characteristics and risk factors. The resulting data would indicate the underlying causes or circumstances of falls and how these differ between men and women. Clarifying these differences and obtaining information about the location and events preceding a fall-related injury is vital to identifying high-risk behaviors and situations and to developing and implementing improved fall prevention strategies.

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Pedestrian Injuries

The Problem

In the United States, a total of 4,749 pedestrians died from traffic-related injuries and another 70,000 sustained nonfatal injuries in 2003. On average, a pedestrian is killed in a traffic crash every 111 minutes and is injured every 8 minutes (NHTSA 2004).

- In 2003, almost one quarter (22%) of children ages 5 to 9 years killed in traffic crashes were pedestrians (NHTSA 2004).
- Pedestrians ages 75 and older accounted for 16% of all pedestrian deaths and about 6% of nonfatal pedestrian injuries in 2003. The pedestrian death rate for this age group is higher than for other age groups (NHTSA 2004).
- The pedestrian fatality rate is more than twice as high for men as for women (NHTSA 2004).
- In 2003, 34% of pedestrians killed by a motor vehicle and 13% of drivers who killed pedestrians were intoxicated, with blood alcohol concentrations of 0.08% or more (NHTSA 2004).

Certain racial and ethnic groups are at increased risk for pedestrian deaths (CDC 2005).

- American Indians and Alaska Natives have rates 3 times higher than whites.
- African-Americans pedestrian deaths are 1.7 times that of whites.
- Hispanics die at a rate 1.8 times higher than non-Hispanics.

CDC's Accomplishments

Understanding community characteristics

CDC-funded researchers at Johns Hopkins University studied community characteristics that may affect interventions to prevent child pedestrian injuries. Researchers compared four neighborhoods with varying risks of pedestrian injury and median household income. Their findings associated child pedestrian risk with wide roads and parking on both sides of the street. Although parents often allowed children younger than the recommended age of 10 years to cross streets alone, researchers found that parents were willing to become involved in child pedestrian safety initiatives.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to pedestrian safety. A sample of those extramural research projects follows. For more information about these and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Mapping risk and evaluating interventions.** The Departments of Public Health and Parking and Traffic in the County of San Francisco have been funded to better understand pedestrian safety and to pursue intervention strategies. They will use geographic information systems (GIS) to analyze pedestrian

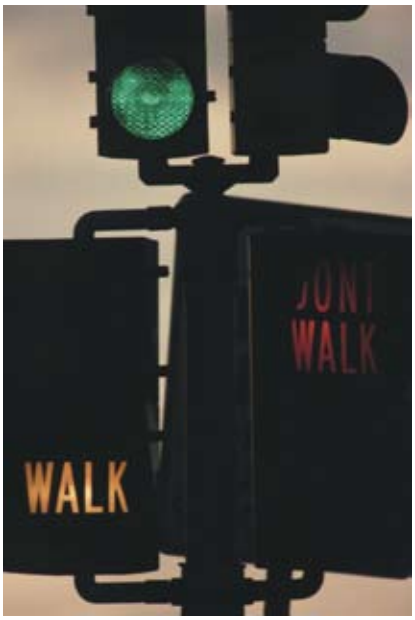
injury outcomes by location. This analysis will be used to identify intersections, neighborhoods, and traffic corridors that are most hazardous to pedestrians; to identify environmental risk factors that constitute those hazards; and to evaluate the effect of installing special pedestrian signals.

- **Pediatric pedestrian safety in virtual reality.** Researchers at the University of Alabama at Birmingham are developing and validating virtual reality (VR) software as a tool for training children about pedestrian safety. VR software and hardware will be developed to simulate a street with realistic, computer-controlled traffic patterns. The virtual environment will allow participants to engage in (and investigators to measure) street-crossing behavior in a laboratory or classroom setting. While engaging in the virtual environment, participants will stand on an artificial curb, view traffic on a five-monitor semicircular display in front of them, and hear traffic through surround-sound speakers. Stepping off the curb will activate a pressure sensor connected to the computer to record when participants begin crossing. After the software is developed, two validation studies will be conducted: one with adults and a second with children. Subsequent research phases will use the VR environment as an intervention tool to train children on pedestrian safety.

Future Steps

To improve pedestrian safety and to identify the most effective interventions, rigorous evaluation of prevention programs must continue. Meanwhile, some evidence shows that environments can be modified to substantially reduce the risk of pedestrian injuries (Retting et al. 2003).

Such modifications include separating pedestrians from vehicles by time or space (e.g., sidewalks), increasing pedestrian visibility (e.g., better lighting at crosswalks), and reducing vehicle speed (e.g., replacing conventional intersections with roundabouts).



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Residential Fires

The Problem

Available statistics show the United States has the sixth highest fire death rate among 25 developed countries (International Association for the Study of Insurance Economics 2003). On average in the United States in 2003, someone died in a fire every 2 hours (every 134 minutes), and someone was injured every 29 minutes (Karter 2004).

- In 2003, fire departments responded to 402,000 home fires in the United States which claimed the lives of an estimated 3,145 people (not including firefighters) and injured another 14,075 (Karter 2004).
- Cooking is the primary cause of residential fires; smoking is the leading cause of fire-related deaths (Ahrens 2003). Alcohol contributes to about 40% of residential fire deaths (Smith et al. 1999).
- In 2003, residential fires resulted in direct property damage totaling $6 billion (Karter 2004).

Who is at the greatest risk for fire-related deaths?

- Children ages 4 and younger (CDC 2005)
- Adults ages 65 and older (CDC 2005)
- The poorest Americans (Istre et al. 2001)
- African Americans and Native Americans (NCHS 1998)
- Persons living in rural areas (Ahrens 2003)
- Persons living in manufactured homes or substandard housing (Runyan et al. 1992; Parker et al. 1993)

CDC's Accomplishments

Preventing residential fire-related injuries

CDC works in partnership with the U.S. Fire Administration (USFA), the U.S. Consumer Product Safety Commission (CPSC), and several nongovernment organizations to coordinate a national effort that will help to eliminate residential fire deaths by 2020. To support this effort, Congress appropriated $5 million in fiscal year 2002 to the three agencies for a new fire safety campaign targeting high-risk populations—older adults, children, and firefighters. The partners have initiated activities related to surveillance, research, community programs, and marketing. Joint activities include research on the risk factors for residential fire-related injuries; data collection and analysis to track trends and progress; CDC's community-based smoke alarm installation and fire safety education project; and a pilot project to examine a community-based Civilian Fire Safety Corps, whose primary purpose is to conduct fire safety education. Recently, CDC and USFA began to assess the effectiveness of fire safety programs and initiatives that their agencies have traditionally funded.

Funded partnership saves lives

Since 1998, CDC has funded smoke alarm installation and fire safety education programs in high-risk communities—those with fire death rates higher than state and national averages and median household incomes below the poverty level. An informal sample of program homes found that an estimated 1,071 lives may have been saved thus far. Program staff have canvassed more than 382,000 homes and installed more than 275,000 long-lasting smoke alarms in high-risk homes, targeting households with children ages 5 years and younger and adults ages 65 years and older. Fire safety messages have reached millions of people because of these programs. CDC funded 14 states from 1998 to 2000. Based on the success of these programs, CDC awarded five-year cooperative agreements to 13 states in 2001 to install long-lasting, lithium-

powered smoke alarms and to provide fire-safety education for homes in high-risk communities. Those states are: Alabama, Alaska, Georgia, Kansas, Kentucky, Minnesota, Mississippi, New York, North Carolina, Oklahoma, South Carolina, Virginia, and Washington. In 2002, an additional 3 states (Arkansas, Massachusetts, and Montana) were awarded funding for these activities, bringing the total number of CDC-funded states to 16.

Three stories demonstrate how these programs helped save lives:

- A young boy awoke to the sound of the smoke alarm that had been installed in his home the year before through a CDC-funded program. A candle that had been left burning near a recliner had set the chair on fire. Upon hearing the alarm, the boy awakened his mother and they escaped without injury. The fire destroyed the house; the smoke alarm saved its residents.
- Firefighters in a major city expressed concern for a particular neighborhood after repeatedly responding to fires in homes without smoke alarms. The firefighters went door-to-door in the community to install smoke alarms and distribute educational materials provided by the Injury Prevention Service at the State Department of Health. In one month, they canvassed a square mile and installed 50 smoke alarms. Not long after their campaign, a six-year-old child in one of the homes started a fire while playing with matches. The smoke alarm alerted the mother, and the residents of the home escaped without injury.
- As part of a CDC-funded program, a firefighter installed a working smoke alarm for a family whose alarm had no battery. A few weeks later, the father woke early to light an oil space heater. Under medication for surgery at the time, he forgot to open the damper to the chimney. He returned to bed, and the heater soon began discharging soot throughout the home. Smoke from the heater quickly reached the next room, which contained the newly installed alarm. The alarm woke the family, and they immediately turned off the heater before opening doors and windows to ventilate the home. The father stated that if the alarm hadn't sounded, the family would have suffered smoke inhalation, carbon monoxide poisoning, or worse.

Program to prevent fire- and fall-related deaths among older adults

In October 2000, CDC began funding state health departments in Arkansas, Maryland, Minnesota, North Carolina, and Virginia to implement and evaluate a program to teach older adults how to prevent fires and falls. Remembering When: A Fire and Fall Prevention Program for Older Adults is a curriculum developed by the National Fire Protection Association, CDC, and other partners. Remembering When uses lesson plans, brochures, fact sheets, game cards, and other educational materials to present 16 life-saving lessons. This program is the first of its kind to combine education about both fire- and fall-related injury prevention among older adults and is one of the few off-the-shelf programs available to communities for this purpose. To date, at least 382 group presentations and 457 individual presentations have been conducted and 3,245 alarms have been installed.

In August 2002, CDC and Georgia State University began to evaluate the effectiveness of the Remembering When program. The evaluation included an examination of knowledge and skills needed to reduce falls and fires. Preliminary data show significant knowledge increases in areas such as space heater safety, safest clothing to wear, and bathtub falls. The home assessment shows gains in use of bath mats, night-lights, and workable smoke alarms. Manuscripts, including recommendations, are being developed.

Informing consumers about smoke alarm options

CDC has been working with the U.S. Consumer Product Safety Commission, National Institute of Standards and Technology, National Fire Protection Association, Underwriters Laboratories Inc., the U.S. Fire Administration, U.S. Department of Housing and Urban Development, and other partners to evaluate current and prototypic smoke alarm technologies. Researchers have tested the smoke alarm responses to serious residential fires and resistance to nuisance alarms. An official report documenting the findings is available at http://smokealarm.nist.gov.

Understanding human behaviors during a residential fire

CDC is directing development of the Human Behavior Fire Study (HBFS), in collaboration with the Battelle Centers for Public Health Research and Evaluation and the University of Maryland's Department of Fire Protection Engineering. This research identifies behavioral factors in residential fires associated with injuries and fatalities. To develop effective public health interventions to reduce the number of fire-related casualties, people's responses to a fire event must be identified and characterized. Researchers will gather detailed data on the sequence of events and behaviors of people involved in fires by interviewing those injured in residential fires or their surrogates. Data to be collected and analyzed include the cause of the fire, behaviors at each point in time following awareness of the fire, and injury outcomes.

CDC-funded research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to residential fires. An example of those extramural research projects follows. For more information about grants and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Rural smoke alarm trial.** University of Iowa researchers are comparing the effectiveness of two alternative types of smoke alarms and two different life spans of battery. The primary study outcome is the presence of working smoke alarms. At the start of the study, researchers will install new, battery-powered photoelectric alarms in 400 homes and ionizing alarms in 400 homes. Half the alarms in each group will have alkaline batteries; in the other half, the alarms will have lithium batteries. After 18 months and 42 months, researchers will revisit the homes to determine which ones still have working alarms.

Future Steps

Efforts to address residential fire-related injuries and deaths in this country must include the following activities:

- Across the country, track the number of homes with sprinkler systems and homes with an adequate number of correctly placed, working smoke alarms; identify communities with legislation and local ordinances related to fire-injury prevention (e.g., requirements for hard-wired smoke alarms and sprinkler systems).
- Expand existing smoke alarm installation and fire safety education programs.
- Apply lessons learned from an evaluation of current programs to increase the effectiveness and efficiency of community-based programs.
- Expand foundational research settings to include apartment buildings and high-rises.
- Research fire prevention technology (e.g., more effective, long-lasting smoke alarms; residential sprinkler systems; safer portable heaters; stoves with automatic shut-off features; and fire-retardant housing materials).
- Perform cost-benefit and cost-effectiveness studies to better understand the economic impact of interventions.

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Road Traffic Safety

The Problem

In a report issued by the World Health Organization (WHO) in 2004, Peden et al. described the severity of the problem:

- Road traffic crashes kill 1.2 million people a year worldwide—an average of 3,242 people every day.
- Road traffic crashes injure or disable 20 million to 50 million people each year.
- Road traffic crashes rank as the 11th leading cause of death and account for 2% of all deaths globally.
- Most road traffic injuries affect people in low- and middle-income countries, especially young males and vulnerable road users such as pedestrians and cyclists.
- By 2020, road traffic injuries are predicted to become the third largest contributor to the global burden of disease.
- The economic cost of road traffic injuries is enormous; worldwide, the cost is an estimated $518 billion.

CDC's Accomplishments

CDC partners with WHO to celebrate World Health Day 2004: Road Traffic Safety

CDC took an active role celebrating World Health Day 2004, the theme of which was "Road Safety is No Accident." CDC Injury Center staff represented CDC and the Department of Health and Human Services at key events, including the official WHO launch of the *World Report on Road Traffic Injury Prevention*, held in Paris, and the U.S. launch of World Health Day. Staffers also observed World Health Day by coordinating related events addressing road safety. The theme for CDC's U.S. World Health Day activities, "Family Road Safety: Protect the Ones You Love," focused on occupant protection, impaired driving, pedestrian safety, and helmet use. CDC distributed more than 3,800 World Health Day information kits, displayed World Health Day banners at injury conferences, and published information about World Health Day and the *World Report* in CDC's *Morbidity and Mortality Weekly Report*, available at www.cdc.gov/mmwr/preview/mmwrhtml/mm5312a1.htm.

World Report on Road Traffic Injury Prevention

CDC researchers participated with WHO to plan, develop, and write the *World Report on Road Traffic Injury Prevention*—the first major report jointly issued by the WHO and the World Bank about road traffic injuries. The report underscores concerns that unsafe road traffic systems (drivers, roads, vehicles) seriously harm global public health and development. The authors contend that the level of road traffic injury is unacceptable and largely avoidable. The report was launched on April 7, 2004, in conjunction with World Health Day.

Future Steps

CDC staff are members of the United Nations (UN) Road Safety Collaboration, a WHO-led initiative to coordinate road safety and health efforts worldwide as specified in the UN General Assembly resolution 58/289 (improving global road safety) and the World Health Assembly resolution 557.10 (road safety and public health). To support this effort, CDC helped design and field-test injury prevention training curricula for use in developing countries. In the next few years, staff members will work closely with WHO, the Pan American Health Organization (PAHO), and other international organizations to help package and disseminate these curricula (which include road traffic injury surveillance and program evaluation) to developing countries. CDC will continue to work closely with other UN organizations to develop strategies for implementing the recommendations from the 2004 *World Report on Road Traffic Injury Prevention.*

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School Violence

The Problem

- Between 1994 and 1999, 172 students ages 5 to 18 were killed on or near school grounds or at school-related activities (Anderson et al. 2001).
- More than 50% of school-associated violent deaths occur at the beginning or end of the school day or during lunch (Anderson et al. 2001).
- School-associated homicide rates are highest near the start of each school semester; suicide rates are generally higher in the spring semester (CDC 2001).
- Overall, nonfatal violence-related behaviors among high school students in the United States have decreased since 1991 (CDC 2004).
- In a nationwide survey, 12.8% of students had been in a physical fight on school property one or more times in the 12 months preceding the survey (Grunbaum et al. 2004).
  - Among students nationwide, 6.1% reported carrying a weapon (e.g., gun, knife, or club) on school property in the 30 days preceding the survey.
  - Nationwide, 9.2% of students had been threatened or injured with a weapon (e.g., gun, knife, or club) on school property one or more times in the 12 months preceding the survey. Overall, the prevalence of having been threatened or injured with a weapon on school property was higher among males (11.6%) than females (6.5%).
  - Some students nationwide (5.4%) had not attended school at least one of the 30 days preceding the survey because they felt unsafe at school or while en route.

School-related violent deaths are those that occur on school grounds, on the way to and from school, and on the way to and from school-sponsored activities (Anderson et al. 2001).

CDC's Accomplishments

Tracking school-associated violent deaths

With the U.S. Department of Education and U.S. Department of Justice, CDC has conducted a national study of school-associated violent deaths since 1992. The latest findings, published in the *Journal of the American Medical Association* in 2001, show 220 incidents of school violence occurred between July 1, 1994, and June 30, 1999. Most incidents were homicides involving firearms. While the number of incidents has decreased steadily since 1992, the number of multiple-victim incidents has increased. This study plays an important role in monitoring school violence trends, identifying risk factors for school violence, and assessing the effects of prevention efforts.

Multisite project evaluates prevention effort

CDC is funding a multisite trial of a violence prevention program aimed at middle school students. Thirty-seven middle schools in four states are participating. The program being

evaluated teaches students conflict resolution and problem-solving skills, trains teachers about violence prevention, and engages family members in program activities. The project—affiliated with Virginia Commonwealth University, the University of Illinois at Chicago, the University of Georgia, and Duke University—represents one of the largest efforts to date to assess the effectiveness of school-based violence prevention among middle school students.

National resource center offers wealth of information

The National Youth Violence Prevention Resource Center serves as a central source for information and materials gathered from institutions, community-based organizations, and federal agencies working to prevent violence among our nation's youth. The Center's website, toll-free hotline, and fax-on-demand service offer access to information about prevention programs, publications, research and statistics, and fact sheets. The website links parents, teens, and researchers to materials designed specifically for those audiences. Each month, the Center hosts more than 37,000 website visitors, fulfills more than 500 requests for publications and youth violence prevention materials, and responds to more than 100 public inquiries and requests for technical assistance. For more information, call 1-866-SAFEYOUTH (1-866-723-3968) or visit www.safeyouth.org.

Assessment tool for school environments

CDC is supporting the development of a tool to assess the physical characteristics of schools that can contribute to feelings of safety, increase prosocial behavior, and decrease aggressive behavior. The tool uses the Crime Prevention Through Environment Design (CPTED) framework. The core principles of CPTED include reducing opportunities for crime, enhancing natural surveillance of activities, and reinforcing a sense that the environment is cared for and that problems will be addressed.

Enhancing State Capacity to Address Child and Adolescent Health Through Violence Prevention (ESCAPe)

CDC's ESCAPe program is designed to develop capacity and leadership in preventing all types of violence toward or among children and adolescents, including school-associated violence. The planning and implementation phases of this project will address shared risk and protective factors for these forms of violence. Colorado, Iowa, Massachusetts, Michigan, Minnesota, New Mexico, Rhode Island, and Virginia have received funding.

Social and character development research program

CDC and the U.S. Department of Education have launched a social and character development research program. Researchers are evaluating the effectiveness of interventions designed to promote positive social and character development, increase positive behaviors, and reduce antisocial behaviors among elementary school children.

Academic centers link researchers and communities

Eight colleges and universities have received CDC funding to establish National Academic Centers of Excellence (ACEs) on Youth Violence. These centers foster joint efforts between university researchers and communities to address the problem of youth violence, including violence at school. For information about specific

Just the Facts . . .

Risk Behaviors Among High School Students

Findings from students surveyed nationwide (Grunbaum 2004):

- 6.1% had carried a weapon (e.g., gun, knife, or club) on school property in the 30 days preceding the survey.
- 9.2% had been threatened or injured with a weapon (e.g., gun, knife, or club) on school property one or more times during the 12 months preceding the survey.
- 12.8% had been in a physical fight on school property one or more times during the 12 months preceding the survey.
- 5.4% had not gone to school on at least one of the 30 days preceding the survey because they felt unsafe at school or while en route.

programs to prevent school violence conducted by the ACEs, visit www.cdc.gov/ncipc/res-opps/ACE/ace.htm.

Collaboration with other parts of CDC

CDC's Injury Center has worked with the Division of Adolescent and School Health, part of CDC's National Center for Chronic Disease Prevention and Health Promotion, on a number of projects related to school violence. Examples of this collaboration follow:

- **School Health Guidelines to Prevent Unintentional Injuries and Violence**. These guidelines help state and local educational agencies and schools promote safety and teach students the skills needed to prevent injuries and violence. Guidance is provided for all components of a coordinated school health program encompassing all grade levels. Specialists from universities and from national, federal, state, and local agencies and organizations collaborated to develop the guidelines. Development was based on in-depth review of research, theory, and current practice in unintentional injury, violence, and suicide prevention; health education; and public health. The guidelines are available at www.cdc.gov/HealthyYouth/injury/guidelines.
- **Healthy Passages.** Healthy Passages is a multiyear longitudinal study to help families, schools, communities, and health care providers understand how children grow to be healthy, educated, and productive members of society. The study will help explain why young people make healthy or risky behavior choices. Data collection, which began in fall 2004, will provide information about injury and violence issues, including individual and family factors associated with bullying and how behaviors change over time.
- **Youth Risk Behavior Surveillance System.** CDC's Youth Risk Behavior Surveillance System (YRBSS) monitors priority health risk behaviors that contribute to the leading causes of death, disability, and social problems among youth and adults in the United States, including behaviors that contribute to unintentional injuries and violence. The YRBSS consists of national, state, and local school-based surveys of representative samples of 9th through 12th grade students. The surveys, conducted biennially, provide information on suicide- and interpersonal violence-related behaviors both on school property and in the community.
- **School Health Policies and Programs Study (SHPPS).** This national survey is conducted periodically to assess school health policies and programs at state, district, school, and classroom levels. SHPPS was first conducted by CDC's Division of Adolescent and School Health (DASH) in 1994 and was repeated in 2000. SHPPS provides information on health education, programs, environmental strategies, and policies that states, districts, and schools use to address violence and suicide prevention.
- **School Health Index.** This self-assessment and planning tool enables a school to identify the strengths and weaknesses of its health and safety policies and programs; to develop an action plan for improving student health and safety; and to involve teachers, parents, students, and the community in improving school services. The third edition of the School Health Index, including unintentional injury and violence prevention items, is available at www.cdc.gov/nccdphp/dash/SHI/index.htm.

Future Steps

CDC's Injury Center works to improve the capacity of local and state authorities, community-based organizations, and private sector partners so they can better support services and policies proven to prevent school violence.

Steps to prevent school violence:

- Continue work with partners such as the U.S. Department of Education and U.S. Department of Justice to better track and monitor school violence.
- Identify factors that increase or decrease risk of school violence.
- Develop and test new strategies to prevent school violence.

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Sexual Violence

Sexual violence includes a wide range of acts that occur in different settings.

There are four types of sexual violence (Basile and Saltzman 2002):

- **Attempted (but not completed) sex act without the victim's consent**, or involving a victim who is unable to provide consent or to refuse.
- **Abusive sexual contact** including intentional touching, either directly or through the clothing, of the genitalia, anus, groin, breast, inner thigh, or buttocks of any person without his or her consent, or of a person who is unable to consent or to refuse.
- **Completed sex act without the victim's consent**, or involving a victim who is unable to provide consent or to refuse. A sex act is defined as contact between the penis and the vulva or the penis and the anus involving penetration, however slight; contact between the mouth and penis, vulva, or anus; or penetration of the anal or genital opening of another person by a hand, finger, or other object.
- **Non-contact sexual abuse** including voyeurism; intentional exposure of an individual to exhibitionism; pornography; verbal or behavioral sexual harassment; threats of sexual violence to accomplish some other end; or taking nude photographs of a sexual nature of another person without his or her consent or knowledge, or of a person who is unable to consent or refuse.

The Problem

- According to the National Violence Against Women Survey, 1 in 6 women and 1 in 33 men in the United States has experienced at least one attempted or completed rape in their lifetime (Tjaden and Thoennes 2000).
- The National Violence Against Women Survey estimates that 302,091 women and 92,748 men were raped in the 12 months prior to the survey. Victims often experience more than one rape. Of those raped in the 12 months preceding the survey, on average, women experienced 2.9 rapes and men experienced 1.9 rapes (Tjaden and Thoennes 2000).
- In 8 of 10 rape cases, the victim knew the perpetrator (Tjaden and Thoennes 2000).
- Fifty-four percent of female rapes occur before age 18; 22% of these rapes occur before age 12 (Tjaden and Thoennes 2000).
- According to the Youth Risk Behavior Survey, a national survey of high school students, about 9% of students report having been forced to have sexual intercourse at some time in their lives. More female students (11.9%) than male students (6.1%) reported having been sexually assaulted. Overall, 12.3% of black students, 10.4% of Hispanic students, and 7.3% of white students reported forced sexual intercourse (Grunbaum et al. 2004).
- A review of state Child Protective Services (CPS) records for child abuse and neglect showed that 88,656 children in the United States experienced sexual abuse in 2001 (ACYF 2004).
- A number of long-lasting physical symptoms and illnesses are associated with sexual victimization including chronic pelvic pain; premenstrual

syndrome; gastrointestinal disorders; and a variety of chronic pain disorders such as headache, back pain, and facial pain. Reproductive and mental health consequences are also associated with sexual victimization (Krug et al. 2002; Campbell and Soeken 1999; Koss and Heslet 1992).

CDC's Accomplishments

Measuring the incidence and prevalence of intimate partner violence and sexual violence

With external partners, CDC has developed two surveys to help states better assess the problem of intimate partner violence, sexual violence, and resulting injuries. The surveys are available as optional modules in the CDC Behavioral Risk Factor Surveillance System. In addition to providing data on the incidence and prevalence of the problem, these surveys will provide knowledge of the related attitudes and norms that allow violence to occur. Data may also be used to compare statistics across states, assess the impact of programs, and guide policy development.

Uniform Definitions and Recommended Data Elements for Sexual Violence

In 2002, CDC published *Sexual Violence Surveillance: Uniform Definitions and Recommended Data Elements* to improve and standardize data collection. In the absence of standards, researchers have used varying terms to describe acts of sexual violence. These inconsistencies have contributed to confusion and a lack of consensus about the magnitude of the problem. Consistent data allow researchers to better gauge the scope of the problem, identify high-risk groups, and monitor the effects of prevention programs.

CHOOSE RESPECT campaign aims to prevent intimate partner and sexual violence

CHOOSE RESPECT, launched May 2006, is a communications campaign that encourages adolescents to develop positive, respectful relationship behaviors. The campaign is designed to reach 11- to 14-year-olds and the caring adults in their lives with prevention messages about choosing respectful, positive relationship behaviors before norms and attitudes that support violence against women are firmly established. Campaign elements include a website, an interactive music video maker, an education video, brochures, posters, cinema slides, and radio and TV spots.

Collaborations to prevent child sexual assault

CDC is funding three state organizations (Prevent Child Abuse Georgia; Project Pathfinder, Inc., in Minnesota; and Massachusetts Citizens for Children) to develop and implement statewide child sexual abuse prevention programs. The programs focus on adult or community responsibility in preventing the perpetration of child sexual assault. The funding supports projects using existing infrastructures to broaden prevention efforts.

Evaluation assistance for projects to prevent first-time male perpetration of sexual violence

CDC has provided evaluation assistance on four projects designed to prevent first-time perpetration of sexual violence by males. As these projects build capacity to conduct their own evaluations independently, CDC will foster project improvements through training and coaching on the use of evaluation concepts, techniques, and findings.

Rape Prevention and Education Program

CDC administers the Rape Prevention and Education (RPE) program and provides technical assistance to health departments, sexual assault coalitions, and other partner organizations or agencies. The RPE program supports educational seminars, hotline operations, training programs for professionals, informational materials, and other efforts to increase awareness of sexual violence, including that perpetrated by intimate partners. Through this program, all 50 states and U.S. territories have implemented prevention and education programs and have developed a stronger infrastructure to address sexual violence.

Rape Prevention and Education program evaluability assessment

To enhance the administration and use of Rape Prevention and Education (RPE) funding, CDC assessed how states allocate RPE funds and the types of activities the funds support. The primary objectives of this study were to document the goals and objectives of the RPE program as it relates to the activities of state health departments and sexual assault coalitions; to assess the allocation mechanisms, uses, and impact of the funds; and to assess the public health needs of states and local programs in terms of knowledge, skills, resources, and barriers to effective implementation. The assessment provided CDC with recommendations which are currently being implemented to improve the administration and efficacy of the RPE program.

Violence against women evaluation guide

CDC developed a *Violence Against Women Evaluation Guide* to help programs develop and implement outcome evaluations. The *Guide* will assist programs in selecting useful, feasible, ethical, and accurate evaluation strategies. It clearly defines evaluation research based on CDC guidelines and provides an

overview of the issues to be considered in evaluating programs to prevent violence against women. Information about data collection methodology and measures, data analyses, presentation of results, and selection of an external evaluator will be included. The *Guide* is expected to be released in 2006.

National Sexual Violence Resource Center

The National Sexual Violence Resource Center (NSVRC) provides information, resources, and research on all aspects of sexual violence. Activities include collecting, reviewing, cataloging, and disseminating information about sexual violence prevention and intervention; coordinating efforts with other organizations; providing technical assistance and customized information; and maintaining a website. The website features links to sexual assault resources and information about upcoming conferences, funding opportunities, job announcements, research, and special events. The NSVRC also produces a biannual newsletter, recommends speakers for conferences, coordinates national sexual assault awareness activities, and identifies emerging policy issues and research needs. The NSVRC serves coalitions, local rape crisis centers, government and tribal entities, colleges and universities, service providers, researchers, allied organizations, policy makers, and the general public (see www.nsvrc.org).

National online resources for violence against women

CDC has funded the Pennsylvania Coalition Against Domestic Violence (PCADV) and the California Coalition Against Sexual Assault (CALCASA) Prevention Connection to provide national, online resources for preventing violence against women. These resources support local, state, national, and tribal agencies and organizations in developing, implementing, and evaluating prevention and intervention programs for violence against women. For more information, visit www.vawnet.org and www.preventconnect.org.

Assessing links between various forms of violence

CDC is conducting a study to identify the links between different forms of violent behaviors among adolescents. The findings will help scientists understand the prevalence and consequences of various aggressive behaviors; the association between dating violence and other forms of peer violence; and the manner in which these types of violent behavior vary by sex, developmental stage, and other factors.

Culturally-competent demonstration projects

CDC funds 10 projects to prevent intimate partner violence and sexual violence among various racial and ethnic populations, including African Americans, American Indians and Alaska Natives, Hispanics, Asians, and Pacific Islanders. These projects have developed and are evaluating programs for children, victims, and perpetrators; programs to prevent dating violence among school-aged youth; and programs that link victims with community-based service providers. The components and outcomes of interest vary by project.

Preventing Violence through Education, Networking, and Technical Assistance (PREVENT)

CDC is funding the University of North Carolina Injury Prevention Research Center to develop a national training program for violence prevention practitioners. The initiative, known as PREVENT (Preventing Violence through Education, Networking, and Technical Assistance), is an outgrowth of the National Injury and Violence Prevention Training Initiative. It is supported by the Society for Advancement of Violence and Injury Research (SAVIR), formerly the National Association of Injury Control Research Centers, and the

Just the Facts . . .

Risk Factors for Perpetration of Rape

Some factors increase the risk that a man will commit rape (Jewkes et al. 2002):

Individual Factors

- Alcohol and drug use
- History of sexual abuse as a child
- Witnessed family violence as a child

Relationship Factors

- Association with sexually aggressive or delinquent peers
- Violent family environment and few resources

Community Factors

- Lack of employment opportunity
- General tolerance of sexual assault within the community

Societal Factors

- Societal norms supportive of sexual violence
- High levels of crime and other forms of violence

State and Territorial Injury Prevention Directors Association (STIPDA). Through PREVENT, individuals and organizations learn to identify community needs and assets; create and mobilize partnerships; develop and implement prevention programs; measure success; and secure funding to sustain programs. PREVENT uses a variety of educational methods including distance-learning modules, regional workshops, an intensive institute, action learning projects, and coaching.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to sexual violence. A sample of those extramural research projects follows. For more information about these and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Primary prevention of child sexual abuse.** The Medical University of South Carolina is conducting two complementary studies to increase understanding of the effects of a community-based media program aimed at raising awareness of the prevalence and consequences of child sexual abuse and educating the public about related prevention and response strategies. Results from these two studies will inform efforts to prevent child sexual abuse and identify possible strategies for refining prevention messages.
- **Sexual violence prevention program for perpetrators.** This project—a collaboration of the Southern Arizona Center Against Sexual Assault, the Pima County Attorney's Office, and the University of Arizona College of Public Health—is implementing and evaluating a perpetrator-focused sexual violence prevention program. The RESTORE program (Responsibility and Equity for Sexual Transgressions Offering a Restorative Experience) is a restorative justice-based, non-adversarial, community-conferencing method to adjudicate first arrests for date or acquaintance rape and non-penetration sexual offenses.
- **Risk for sexual abuse: a study of adolescent offenders.** Researchers at the University of Minnesota are working to identify the unique and shared risk factors for child sexual abuse, sexual assault, and youth violence. The study includes 300 adolescent males who have committed sexual abuse of children, peers, or adults; it also includes adolescent males who have committed other nonsexual types of delinquent behavior. Researchers are examining attitudes toward intimate relationships (attachment style) and involvement with peers, including consensual sexual experiences. Attitudes toward masculinity are also being examined (e.g., beliefs about the importance of competition, violence, and face-saving as an indication of masculinity; confidence in one's own masculinity; and beliefs about sexuality, self-reported sexual behavior, and sexual interest and fantasies). Project results will be disseminated in collaboration with Stop It Now! Minnesota.

Future Steps

Like intimate partner violence, sexual violence often goes unreported because of embarrassment, denial, or fear of retaliation, especially when the perpetrator is someone known to the victim. This underreporting masks the magnitude of the problem of sexual assault in the United States. Even when incidents are reported, they may not be identified or recorded as sexual violence. Similarly, victims seeking medical care after rape or sexual assault may not disclose the true cause of their injuries. If they do, the information may not be recorded in the medical record. To better document the scope of the problem of sexual violence and identify trends in incidence and prevalence, we must improve the quality of data collection at national, state, and local levels.

Scientists, public health professionals, advocates, and others must increase efforts to stop sexual violence from occurring. To this end, CDC is supporting the evaluation of interventions to prevent sexual violence so that science-based recommendations about programs and practices that work can be shared.

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Sports- and Recreation-related Injuries

The Problem

- An estimated 7 million Americans seek medical care annually for injuries sustained during sports or recreation (Conn et al. 2003). An estimated 4.3 million of them are treated in emergency departments (Gotsch et al. 2002).
- Adolescents 10 to 14 years of age have the highest rates of sports- and recreation-related injury (Gotsch et al. 2002).
- About one quarter of people injured during sports or recreation miss one or more days of work or school due to the injury (Conn et al. 2003).
- An estimated 1.6 to 3.8 million sports- and recreation-related traumatic brain injuries occur in the United States each year (Langlois et al. 2006).
- Concussions can occur in any sport, including football, wrestling, soccer, basketball, softball, baseball, field hockey, and volleyball (Powell and Barber-Foss 1999).
- Collegiate and high school football players who have had at least one concussion are at an increased risk for another concussion (Guskiewicz et al. 2000; Zemper 2003).

CDC's Accomplishments

Evaluation of an alternative warm-up program

CDC, in collaboration with the National Collegiate Athletic Association, the American Academy of Orthopaedic Surgeons, the International Federation of Football Associations, and the Santa Monica Orthopaedic and Sports Medicine Research Foundation, conducted a randomized controlled trial of an alternative warm-up program to prevent anterior cruciate ligament (ACL) injuries in female soccer players. Women athletes are disproportionately affected by ACL injuries (Griffin 2001). The research involved implementing and evaluating a physical training program specifically designed to reduce the risk of ligamentous knee injuries by incorporating proven neuromuscular and proprioceptive training concepts into a concise on-field warm-up activity. Results showed that this program reduced the risk of ACL injuries and noncontact ACL injury rates among female soccer players compared with athletes who did not receive the intervention.

Tool kit raises awareness about sports-related concussions

In 2004, CDC developed *Heads Up: Concussion in High School Sports*—a tool kit for high school athletic coaches containing materials about how to prevent, recognize, and manage sports-related concussions. The tool kit will also assist coaches in educating athletes, athletes' parents, and school officials about sports-related concussions.
In early 2005, CDC conducted a pilot study to evaluate the tool kit's effectiveness. Of the nearly 500 responses, most were positive—74% found the materials very easy to use, and 94% said the tool kit had just enough detail. More than two thirds of coaches reported being aware of incidents of sports-related concussions occurring at their schools; one third of the coaches had no access to education materials prior to receiving the tool kit. Also, 20% of coaches reported that their athletic department had no plan for dealing with concussions; however, most coaches (96%) thought the tool kit materials could be used to develop a plan. The revised tool kit, based on findings from the pilot study, now includes a DVD. The tool kit initiative, launched September 2005, distributed tool kits to more than 10,000 coaches, athletic directors, and principals in high schools nationwide. To order free of charge or download materials, visit www.cdc.gov/ncipc/tbi/Coaches_Tool_Kit.htm.

Research illuminates impact of sports- and recreation-related injuries

CDC researchers found that from 1997 through 1999, an estimated 7 million Americans received medical attention for sports- and recreation-related injuries each year. Almost one third

of these injuries occurred at sports facilities, and basketball ranked as the lead sport for injuries among organized and backyard or pickup games. More than two thirds of the people treated for sports- and recreation-related injuries were 5 to 24 years old (Conn et al. 2003).

CDC extramural research grants

CDC funds grants to researchers at universities, medical institutions, and community-based organizations to study various factors related to sports and recreation injuries. An example of those extramural research projects follows. For more information about grants and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Evaluation of existing sports injury interventions and countermeasures in high school varsity football.** Researchers at the UCLA-Southern California Injury Prevention Research Center are using a multilevel study design to identify primary, secondary, and tertiary prevention measures in place at local high schools; measure whether these interventions affect the frequency and severity of injury; compare treatment protocols across schools; and estimate costs of medically treated injuries in selected sports clinics. Investigators will focus on two samples of football teams: those that are under medical supervision by a local sports clinic and those that are not.

Future Steps

In 2004, CDC convened a panel of experts to explore potential collaborations for the development of public health surveillance, research, and programming which would promote physical activity while minimizing the risk of injury. This meeting was supported by the National Swimming Pool Foundation. CDC will use the outcomes from this meeting to shape collaborative research and program priorities.

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Suicide

The Problem

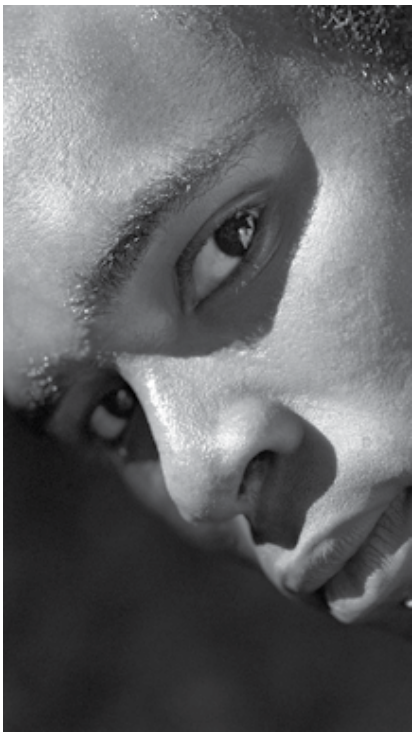
Each year in the United States, more people commit suicide than die from homicide.

- In 2002, 31,655 Americans took their own lives, an average of 87 people each day (CDC 2004).
- Completed suicides reflect only a small portion of the impact of suicidal behavior. In 2003, 176,707 individuals were hospitalized following suicide attempts; 130,004 were treated in emergency departments and released (CDC 2004).
- Although females attempt suicide more often than males (DeLeo et al. 2002), males are four times as likely to die from suicide. U.S. statistics for 2002 show that males account for 80% of suicides overall (CDC 2004).
- Suicide is the third leading cause of death among young people ages 15 to 24. In 2001, 4,010 suicides were reported in this age group (Kochanek et al. 2004).
- Suicide rates are highest among those 65 years and older. In 2002, 5,548 Americans over age 65 committed suicide, averaging one suicide every 90 minutes (CDC 2004; DHHS 2001). Men committed 85% of these suicides (CDC 2004).
- In 2002, 56% of suicides were committed with a firearm (Kochanek et al. 2004).

CDC's Accomplishments

Reporting system to provide objective, timely violence data

State and local agencies acquire detailed information from medical examiners, coroners, police, crime labs, and death certificates that could answer fundamental questions about violence trends and patterns. This information is fragmented and difficult to access. Consequently, CDC has funded 17 states—Alaska, California, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wisconsin—to establish the National Violent Death Reporting System (NVDRS) to gather, share, and link state-level data about violence-related deaths. When fully implemented, NVDRS will enable CDC to pull together vital state-level information to gain a more accurate understanding of the problem of violence, including suicide, and to enable policy makers and community leaders to make informed decisions about prevention strategies.



Study tracks school-associated violent deaths

With the U.S. Departments of Education and Justice, CDC is conducting an ongoing national study of school-associated violent deaths. Since 1992, this study has played an important role in monitoring trends related to school-associated violent deaths (including suicide), identifying risk factors, and assessing the effects of prevention efforts.

Integrating data for more accurate suicide measures

CDC has established a Suicide Prevention Research Center at the Trauma Institute of the University of Nevada School of Medicine. The Center has developed a pilot surveillance system to help states

Just the Facts . . .

Suicide Among High School Students

CDC's 2003 nationwide study of high school students revealed alarming responses about suicide (Grunbaum et al. 2004):

- 16.9% had seriously considered suicide during the 12 months preceding the survey;
- 16.5% had made a plan to attempt suicide during the 12 months preceding the survey;
- 8.5% had attempted suicide one or more times during the 12 months preceding the survey; and
- 2.9% had attempted suicide during the 12 months preceding the survey that resulted in injury, poisoning, or overdose requiring medical treatment.

integrate data from death certificates, emergency departments, and mental health departments. This new system provides a more accurate and complete measure of suicide rates than do surveillance systems that rely on mortality data alone.

Setting uniform definitions for suicide

Standard definitions for suicide do not exist, and the definitions used in federal and state legislation vary dramatically. These inconsistencies contribute to confusion and a lack of consensus about the magnitude of the problem. CDC is convening an expert panel to review the existing state of suicide surveillance and to recommend definitions for use during data collection. Acquiring better data about suicide will shape prevention efforts and help policy makers and communities make informed public health decisions for allocating prevention resources.

Assessing links between various forms of violence

CDC is conducting a study to identify the links between different forms of violent behaviors among adolescents, including suicide. The findings will help scientists understand the prevalence and consequences of different types of aggressive behaviors; the association between dating violence and other forms of peer violence; and the manner in which these types of violent behavior vary by sex, developmental stage, and other factors.

Understanding suicide risk among adolescents

CDC is funding Battelle Centers for Public Health Research and Evaluation to survey high school-aged adolescents from an urban school district. The research will enhance knowledge about youth suicidal behaviors and associated risk and protective factors; create a viable research and clinical instrument to evaluate suicide risk; and examine the utility of this instrument as a screening tool and outcome measure. The goal is to design better preventive interventions and thereby reduce suicide risk.

Partnering in national suicide prevention strategy

CDC plays a key role in the Federal Steering Group for the Surgeon General's National Strategy for Suicide Prevention. This group coordinates federal initiatives to prevent suicide, funds research, supports workshops, and shares information about suicide facts and prevention activities through such channels as public hearings and the Internet. In early 2001, the group published goals and objectives for the strategy, which include promoting awareness about suicide as a preventable public health problem; developing and evaluating prevention programs; improving the portrayal of suicide, mental health, and drug use in the entertainment and news media; promoting research about suicide and its prevention; and enhancing tracking systems for suicide.

Preventing Violence through Education, Networking, and Technical Assistance (PREVENT)

CDC is funding the University of North Carolina Injury Prevention Research Center to develop a national training program for violence prevention practitioners. The initiative, known as PREVENT (Preventing

Violence through Education, Networking, and Technical Assistance), is an outgrowth of the National Injury and Violence Prevention Training Initiative. It is supported by the Society for Advancement of Violence and Injury Research (SAVIR), formerly the National Association of Injury Control Research Centers, and the State and Territorial Injury Prevention Directors Association (STIPDA). PREVENT helps individuals and organizations build skills for identifying community needs and assets, creating and mobilizing partnerships, developing and implementing prevention programs, measuring success, and securing funds to sustain programs. PREVENT uses a variety of educational methods including distance-learning modules, regional workshops, an intensive institute, action learning projects, and coaching.

Multistate assessment of state suicide prevention planning

CDC is conducting an in-depth, multistate examination of the development and implementation of state suicide prevention plans. The findings will help other states develop suicide prevention plans and gain the support of stakeholders so that these plans can be implemented. Insights gleaned from this study will also help inform state-based prevention efforts in other public health problem areas such as violence against women and child maltreatment.

State suicide prevention program implementation

CDC is funding state injury prevention experts in Maine and Virginia to develop evidence-based suicide prevention programs. These experts are designing and implementing a suicide prevention program tailored to the needs of their state.

National resource center offers wealth of information

The National Youth Violence Prevention Resource Center (www.safeyouth.org, 1-866-SAFEYOUTH 1-866-723-3968) is a central source for information and materials gathered from institutions, community-based organizations, and federal agencies working to prevent violence among our nation's youth. The center's website, toll-free hotline, and fax-on-demand service offer access to information about prevention programs, publications, research and statistics, and fact sheets. The website links parents, teens, and researchers to materials designed specifically for those audiences. The Center responds to more than 100 public inquiries and requests for technical assistance, fulfills more than 500 requests for publications and youth violence prevention materials, and hosts more than 37,000 website visitors each month.

Collaboration with other parts of CDC

CDC's Injury Center has worked with the Division of Adolescent and School Health, part of CDC's National Center for Chronic Disease Prevention and Health Promotion, on a number of projects related to suicide prevention. Examples of these collaborations follow.

- **School Health Guidelines to Prevent Unintentional Injuries and Violence.** The guidelines help state and local educational agencies and schools promote safety and teach students the skills needed to prevent injuries and violence. Guidance is provided for all components of a coordinated school health program for all grade levels. The guidelines, developed in collaboration with specialists from universities and from national, federal, state, and

Just the Facts . . .

Risk and Protective Factors for Suicide

(DHHS 1999)

A **risk factor** for suicide is anything that increases the likelihood that people will harm themselves. Risk factors for suicide include:

- Previous suicide attempt(s);
- History of depression or feelings of hopelessness;
- Precipitating events such as the breakup of a relationship;
- Easy access to lethal methods; and
- Isolation, or a feeling of being cut off from other people.

Protective factors buffer people from the risks associated with suicide. Protective factors for suicide include:

- Effective clinical care for mental, physical, and substance abuse disorders;
- Family and community support;
- Support from ongoing medical and mental health care relationships;
- Skills in problem solving, conflict resolution, and nonviolent handling of disputes; and
- Cultural and religious beliefs that discourage suicide and support self-preservation instincts.

local agencies and organizations, are based on an in-depth review of research, theory, and current practice in unintentional injury, violence, and suicide prevention; health education; and public health. The guidelines are available at www.cdc.gov/HealthyYouth/injury/guidelines.

- **Youth Risk Behavior Surveillance System.** CDC's Youth Risk Behavior Surveillance System (YRBSS) monitors priority health risk behaviors that contribute to the leading causes of death, disability, and social problems among youth and adults in the United States, including behaviors that contribute to unintentional injuries and violence. The YRBSS consists of national, state, and local school-based surveys of representative samples of 9th through 12th grade students. The surveys, conducted biennially, provide information on a variety of suicide- and interpersonal violence-related behaviors both on school property and in the community.
- **School Health Policies and Programs Study.** This national survey is conducted periodically to assess school health policies and programs at state, district, school, and classroom levels. School Health Policies and Programs Study (SHPPS) was first conducted by CDC's Division of Adolescent and School Health (DASH) in 1994 and was repeated in 2000. SHPPS provides information about health education, programs, environmental strategies, and policies that states, districts, and schools use to address violence and suicide prevention.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to suicide prevention. A sample of those extramural research projects follows. For information about these and other projects, please visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Help seeking by at-risk youth after suicide screenings.** The Research Foundation for Mental Hygiene, Inc. is conducting a retrospective cohort study of youth identified through screening as at-risk for suicidal behavior. Each at-risk youth and his or her parent will be interviewed about two years after the screen to assess information about the use of services during the intervening period, barriers that may have interfered with seeking or receiving treatment, and the risk status of the youth at follow-up. Findings will guide efforts to develop optimal help-seeking strategies tailored to at-risk youth and their parents to establish effective screening programs to prevent suicidal behavior.
- **Preventing youth suicide in primary care: a family model.** Researchers at Children's Hospital of Philadelphia are testing the efficacy of brief family therapy for adolescents presenting with serious risk for suicide in a primary care setting. The intervention approach will be Attachment-based Family Therapy (ABFT), an efficacious and manualized family therapy model designed specifically for adolescent depression. ABFT has been successful in reducing suicidal ideation, hopelessness, depression, anxiety, and family conflict.

Future Steps

Accurate, timely, and accessible information about suicidal behaviors is crucial for prevention. To better document the scope of the problem, to identify high-risk groups, and to recognize trends in incidence and prevalence, CDC must refine and validate current definitions of suicide and develop systems to monitor and track the problem.

One of the greatest challenges in suicide prevention is to identify promising strategies and programs. CDC must continue research on effective prevention strategies for suicide and suicidal behavior. CDC must also continue to evaluate current interventions and develop and test new ones. As data become available about what works, we must communicate that information to practitioners.

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Supervision of Children

The Problem

Unintentional injuries are the leading cause of death for children, and many of these injuries can be prevented through appropriate supervision. In 2002, 5,305 children 14 years and younger died from unintentional injuries, and more than 6.5 million were seen in emergency departments. Many studies have described how lapses in supervision lead to injury such as drowning, burns, and poisonings (Pollack-Nelson and Drago 2002; Landen et al. 2003; Simon et al. 2003). The key for preventing many unintentional injury deaths and disabling injuries among children is effective supervision, yet this behavioral component of injury prevention lacks conceptual and methodological clarity. Without this foundation, interventions are difficult to develop and test. CDC's Injury Center is taking the lead in exploring the critical link between supervision and injury prevention.

CDC's Accomplishments

Supervision in injury prevention workshop

CDC sponsored an expert meeting in August 2003 to assess the role of supervision in preventing unintentional injuries among children and to identify areas where more research on supervision is needed. The meeting resulted in several suggestions for developing models of supervision. One priority area for future research is to enhance the evidence base for the role of supervision in injury outcomes.

Disseminating child safety products in urban communities

With CDC support, the hospital-based Children's Safety Center at Johns Hopkins University has launched a traveling Mobile Safety Center. The Mobile Safety Center van travels to clinics and selected sites serving low-income families to conduct safety interventions and to provide parents

with the safety products (e.g., smoke alarms, cabinet latches, stair gates, car seats) they need to better supervise and protect their family. The project has developed training materials, educator protocols, and exhibits to be used by the Mobile Safety Center and the Safety Center clinic. Researchers are evaluating this dissemination strategy compared with others that are clinic based.

Safe Kids at Home

CDC funded SAFE KIDS Worldwide, a global public awareness and education campaign to help prevent unintentional injuries among children 14 and younger. SAFE KIDS Worldwide works with communities in 19 states to develop and disseminate culturally and ethnically diverse home safety educational materials addressing special risks in public housing. In addition to training health department staff and home visiting organizations about home safety and injury prevention, SAFE KIDS Worldwide developed task forces within each community to help sustain the Safe Kids at Home program. Working with their local coalitions, SAFE KIDS Worldwide conducted 26 home safety training workshops for nearly 600 home visitors. During the project, home visitors went to 69,840 homes and installed nearly 57,000 home safety devices, including outlet covers and drawer and cabinet latches. CDC provided additional funding for the development of a low-literacy brochure on home safety and a multimedia train-the-trainer presentation that combines fundamental home safety knowledge with tips for implementing a home safety program.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to supervision. A sample of those extramural research projects follows. For more information about these and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Concept mapping: an innovative method to measure supervision.** Researchers at the George Washington University School of Public Health and Health Services are using the concept mapping process of brainstorming groups, sorting and rating groups, and discussion and interpretation groups to conceptualize child supervision's role in injury prevention. Concept mapping techniques will enable researchers to explore variations in sociodemographic and parenting style for identifying behaviors central to child supervision, to examine conceptualizations of child supervision with regard to injury mechanisms, and to identify styles and processes of child supervision that are perceived to be amendable to change.
- **Injury risk management for young children.** University of California researchers are developing a model of injury risk management for young children. Using an emergency department-based study about the circumstances of injury, researchers will explore the role of supervision in injury and injury risk management. They will follow a cohort of mothers from their children's births to age 30 months to identify individual factors and the interrelationship between those factors. The measurable components of the research model are management of the environment, supervision, use of resources, and adaptation to changing circumstances and child development. Researchers will use study findings to develop and test a clinical assessment tool to identify families who need help with injury risk management for their children.

- **A dynamic model of supervision and injury among children.** Researchers at the University of Rochester are developing and validating a new, comprehensive, and developmentally sensitive measure of supervision. Researchers seek to expand the current focus on how adults structure supervision (through the creation of rules and the direct monitoring of their children). Researchers also want to learn how adults assess the risk inherent in a situation, how they perceive their role in reducing this risk, and how they implement their approach to supervision. Researchers will develop a self-report measure of this expanded conceptualization of supervision, an observational measure of supervision for parents of preschool children, and a child self-report measure of risk-taking and rule compliance for older children.

Future Steps

Research continues to examine the varied supervisory patterns now in use with children of different ages and of different cultures. Behavioral scientists are collaborating to develop measurement tools to compare these various styles of supervision and to evaluate the relative effectiveness of each in preventing injuries. CDC's Injury Center is taking the lead in this important area of research.

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Teens Behind the Wheel

The Problem

Motor vehicle-related injuries are the biggest health threat to teenagers in the United States, accounting for two out of five deaths overall (CDC 2005).

- In 2002, more than 5,000 teens ages 16 to 19 died of injuries caused by motor vehicle crashes (CDC 2005).
- The risk for motor vehicle crashes is higher among 16- to 19-year-olds than among any other age group. In fact, per mile driven, drivers in this age group are four times more likely than older drivers to crash (IIHS 2004).
- In 2002, the estimated economic cost of police-reported crashes (both fatal and nonfatal) involving drivers ages 15 to 20 was $40.8 billion (NHTSA 2003).

CDC's Accomplishments

Young drivers and fatal alcohol-related motor vehicle crashes, 1982–2001

CDC researchers found that between 1982 and 2001, alcohol-related fatal crash rates among drivers ages 16 to 20 decreased almost 60%. Although crash rates decreased among drivers of all ages, the most dramatic decreases were among drivers under age 21. This strong downward trend suggests that prevention measures targeting this age group (national minimum legal drinking age and zero alcohol tolerance laws for young drivers) have been effective. However, despite the successes of the last two decades, progress has stalled in the past few years, and impaired driving remains a serious public health problem for drivers of all ages. In 2003 alone, 1 in 4 drivers ages 15 to 20 who died in motor vehicle crashes had a blood alcohol concentration above the legal limit for adult drivers (NHTSA 2004).

Examining parental influence on teen driving behavior

CDC scientists collaborated with the National Institutes of Health to evaluate a brief intervention with parents and teens designed to increase parental restrictions of teen driving privileges. Results showed that the intervention parents reported more driving rules, restricted driving, limits for high-speed roads, weekend night restrictions, and overall driving limits for their teens than did parents in the control group.

Graduated driver licensing

Graduated driver licensing (GDL) programs—which place restrictions on young drivers that are lifted as they gain driving experience—are an effective strategy for developing safe driving skills. CDC supported research at the UCLA Southern California Injury Prevention Research Center to examine the effectiveness of GDL in California. Results from this study showed a 17% to 18% decrease in crash rates for drivers ages 16 to 17 after GDL. CDC also supported and contributed to a special edition of the *Journal of Safety Research* documenting the current research evidence about GDL. CDC helped fund and contributed to a series of five research papers, published in a September 2002 supplement of *Injury Prevention*. The articles, which reviewed the current status of research on young drivers, make a compelling case for GDL programs.

Effective interventions to prevent alcohol-impaired driving among teens

In systematic reviews of published research studies, a research team led by CDC found evidence that minimum legal drinking age laws and lower BAC laws for young or inexperienced drivers (zero tolerance laws) effectively reduce alcohol-impaired driving. A systematic review of school-based education programs found that such programs reduce the incidence of riding with alcohol-impaired drivers, though there was insufficient evidence that these programs reduced drinking and driving among teens. To learn more about this and other systematic reviews published in *The Guide to Community Preventive Services*, see www.thecommunityguide.org.

Just the Facts . . .

Why Teens are at Risk

Several factors increase a teen's risk for vehicle-related injuries:

- **Inexperience**—Teens often fail to recognize or underestimate the dangers in hazardous situations, and they also have less experience coping with such situations; teens are more likely than older drivers to speed, run red lights, make illegal turns, ride with an intoxicated driver, and drive after using alcohol or drugs (Jonah and Dawson 1987).
- **Low rates of seat belt use**—Compared with other age groups, teens have the lowest rate of seat belt use. In 2003, 18% of high school students reported that they rarely or never wear seat belts when riding in a car as a passenger (CDC 2004).
- **Alcohol and driving**—All 50 states have "zero tolerance" laws that establish a blood alcohol concentration (BAC) limit of 0.02% or lower for drivers under the age of 21. In 2003, 25% of drivers ages 15 to 20 who died in motor vehicle crashes had a BAC of 0.08% or higher, which is above the legal BAC limit for adult drivers (NHTSA 2004). Among teen drivers who were killed in crashes after drinking and driving, 74% were not wearing seat belts (NHTSA 2004).

GDL effect on hospitalization rates and charges for 16-year-old drivers

CDC is funding one of the first studies of the effect of GDL on serious, nonfatal injuries resulting from motor vehicle crashes among 16-year-old drivers. Researchers at the University of North Carolina will examine state crash data and the state's Inpatient Discharge Database to document the rate of hospitalization and associated charges for 16-year-olds from 1996 through 2001, encompassing data after the implementation of the North Carolina GDL program in December 1997. Evidence of GDL's impact on hospitalization rates and charges may assist policy makers and legislators in their efforts to increase the effectiveness of GDL programs.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to teen drivers. One example of an extramural research project follows. For more information about this and other projects, visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Behavioral study to reduce youth DUI and risky driving.** Researchers at the University of Alabama at Birmingham are working to better understand two factors associated with the underlying attitudes that lead to teen involvement in motor vehicle-related crashes: risky behavior and driving under the influence (DUI) of alcohol. In one study, researchers will evaluate social and attitudinal influences on DUI among college students before and after exposure to persuasion methods successfully used in antismoking interventions. In a second study, researchers will conduct focus

groups and phone surveys of 16- to 20-year-old drivers to assess their attitudes and normative beliefs that lead to risky driving. Based on this knowledge, researchers will develop interventions oriented toward exploiting group dynamics as opposed to relying on individual education. In both the DUI and risk-taking studies, the interventions will be pilot tested first in a laboratory and later in a real-world environment.

Future Steps

Driving is a complicated skill that takes time and practice to master. Graduated driver licensing, GDL, is one strategy that allows driving skills to be developed with minimum risk of injury. GDL addresses the high risks new drivers face by requiring an apprenticeship of planned and supervised practice, followed by provisional licensure that temporarily restricts unsupervised driving. Restrictions are lifted as new drivers gain experience and teenage drivers mature. Most states now have some form of GDL in place, but the strength of its components varies widely. In itself, GDL is not the final solution to the problem. More research is needed to identify how family, peers, and others influence teen driving behavior.

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Traumatic Brain Injury

A traumatic brain injury (TBI) is caused by a blow or jolt to the head that disrupts the brain's function. The severity of such an injury may range from "mild" (a brief change in mental status or consciousness) to "severe" (an extended period of unconsciousness or amnesia after the injury). Each year, about 75% of TBIs that occur in the United States are concussions or other forms of mild TBI (CDC 2003). Any TBI is considered serious.

The Problem

Traumatic brain injuries (TBI) contribute to a substantial number of deaths and cases of permanent disability. Each year in the United States, an estimated:

- 1.4 million people sustain a TBI. Of them, 235,000 are hospitalized and survive. These rates are more than 20 times the number of hospitalizations for spinal cord injury, another key disabling injury (Langlois et al. 2004; Johnson 2001);
- 1.1 million people who sustain a TBI are treated and released from an emergency department (Langlois et al. 2004);
- 50,000 people die from a TBI (Langlois et al. 2004); and
- 80,000 to 90,000 people experience the onset of long-term or lifelong disability associated with a TBI (Thurman et al. 1999).

Among children ages 0 to 14 years, TBI results in an estimated:

- 2,685 deaths;
- 37,000 hospitalizations; and
- 435,000 emergency department visits (Langlois et al. 2004).

Falls are the leading cause of TBI; rates are highest among children ages 0 to 4 and adults ages 75 or older (Langlois et al. 2004).

Motor vehicle traffic-related causes result in the greatest number of TBI-related deaths and hospitalizations; rates are highest among adolescents ages 15 to 19 (Langlois et al. 2004).

- In almost every age group, TBI rates are higher for men than for women (Langlois et al. 2004).
- People ages 75 years or older have the highest rates of TBI-related hospitalization and death (Langlois et al. 2004).
- African Americans have the highest death rate from TBI (Langlois et al. 2004).
- An estimated 5.3 million Americans—2% of the population—currently live with disabilities resulting from TBI (Thurman et al. 1999).
- About 75% of TBIs that occur each year are concussions or other forms of mild TBI (CDC 2003).
- Direct and indirect costs of TBI were an estimated $60 billion in the United States in 2000 (Finkelstein et al. 2006).

CDC's Accomplishments

The Children's Health Act of 2000 helps CDC provide continued leadership in the study of TBI. CDC supports multiple projects and programs, including those that monitor TBI, link people with TBI to information and services, and prevent TBI-related disabilities.

Generating national estimates for TBI deaths, hospitalizations, and emergency department visits

CDC supported an analysis of TBI data from its National Center for Health Statistics. This analysis generated national estimates for TBI deaths, hospitalizations, and emergency department visits by sex, age, and geographic region; it also offered information about causes of TBI and average hospital stays for TBI patients. Results of this analysis are the subject of a CDC report, *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations, and*

Deaths, published in 2004. (The report is available online at www.cdc.gov/ncipc/pub-res/TBI_in_US_04/TBI_ED.htm.) This report is the first of its kind to include detailed national data about TBI in a single-reference document.

Identifying persons with TBI among World Trade Center survivors

CDC conducted a rapid assessment of injuries among survivors of the September 11, 2001, World Trade Center (WTC) attack who were seen in emergency departments; CDC found only a small percentage experienced head injury. Because other injured people may have had an undiagnosed TBI, CDC funded New York City's Department of Health and Mental Hygiene to conduct a retrospective study to identify how many people hospitalized with injury after the WTC attack also may have had a TBI. Researchers reviewed inpatient hospital records that identify possible TBI and describe the cause and nature of injuries. Preliminary findings include a number of cases in which signs and symptoms of TBI were listed in patients' medical records, suggesting a TBI even though it was not diagnosed. Researchers have found that some diagnosed TBIs were the result of falling debris or people being trampled.

Planning the future of TBI registries and data systems

In July 2002, CDC convened an expert panel of TBI researchers, advocates, registry administrators, and other professionals to discuss the future of TBI registries and data systems and to obtain guidance in the development of a national program. The report, *Traumatic Brain Injury in the United States: The Future of Registries and Data Systems*, summarizes recommendations made to CDC by the expert panel and includes information about activities related to the TBI Reauthorization Act and the definition of a TBI registry. This report is available online at www.cdc.gov/ncipc/tbi/RegistriesDataSys.htm.

Highlighting CDC-funded TBI research and programs

The May–June 2005 issue of the *Journal of Head Trauma Rehabilitation,* "TBI in the US: Research and Programs of the CDC," provides a comprehensive look at CDC-funded activities for TBI at national and state levels. This special issue also addresses public health principles and TBI legislation; TBI surveillance and education; TBI rates among children, older adults, and American Indians/Alaska Natives; TBI-related outcomes, including the risk of death; and linkage to information and services for people with TBI. The publication is available online at the publisher's website: www.lww.com/product/?0885-9701.

Reporting to Congress about mild TBI

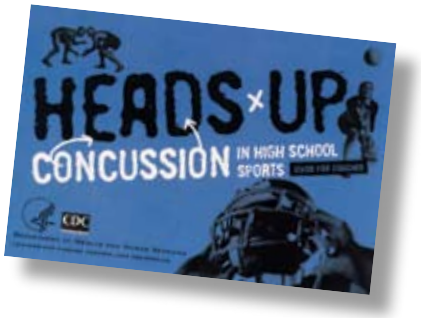
The Children's Health Act of 2000 required CDC to report to Congress on how best to measure the rate at which new cases of mild TBI occur and the proportion of the U.S. population that, at a point in time, experiences signs or symptoms of a mild TBI. To that end, CDC formed the Mild TBI Work Group, comprising experts in brain injury, to determine appropriate and feasible methods for assessing the incidence and prevalence of mild TBI in the United States. *Report to Congress on Mild Traumatic Brain Injury in the United States: Steps to Prevent a Serious Public Health Problem*, published in 2003, presents the Mild TBI Work Group's findings and recommendations.

Standardizing facts and information about TBI

CDC, in collaboration with 10 other TBI agencies and organizations such as the Brain Injury Association of America (BIAA) and the National Association of State Head Injury Administrators (NASHIA), developed a standard TBI fact sheet titled *Facts about Traumatic Brain Injury*. This fact sheet contains up-to-date information about the incidence, causes, risk factors, and costs associated with TBI. It is available online at www.cdc.gov/ncipc/tbi/FactSheets/Facts_About_TBI.pdf.

Preventing and managing sports-related concussions

In 2004, CDC developed an educational tool kit, *Heads Up: Concussion in High School Sports,* for high school athletic coaches. It contains information about how to prevent, recognize, and manage sports-related concussions. It also contains materials to assist coaches in educating athletes, athletes' parents, and school officials about sports-related concussions. A pilot study, conducted in 2005, evaluated the tool kit's effectiveness. Of the nearly 500 responses, 74% found the materials very easy to use, and 94% said the tool kit had just enough detail. More than two thirds of coaches reported being aware of incidents of sports-related concussions occurring at



their schools, and a third had no access to the materials prior to receiving the tool kit. Also, 20% of coaches reported that their athletic department had no plan for dealing with concussions; however, most coaches (96%) thought the tool kit materials could be used to develop a plan. Most coaches said they would give the materials to parents, athletes, and other school officials. The revised tool kit, based on the pilot study, now includes an instructional DVD.

The tool kit initiative, launched September 2005, distributed tool kits to more than 10,000 coaches, athletic directors, and principals in high schools nationwide. To order free of charge or download materials, visit CDC's website: www.cdc.gov/ncipc/tbi/Coaches_Tool_Kit.htm.

Educating health care professionals about TBI

In January 2003, CDC published and disseminated a TBI tool kit called *Heads Up: Brain Injury in Your Practice.* The tool kit contains practical, easy-to-use clinical information, patient information in English and Spanish, scientific literature, and a CD-ROM. More than 150,000 tool kits have been distributed to health care professionals in the United States and internationally. Although the tool kit was originally developed for physicians, other health care providers such as nurse practitioners and physical therapists have requested the materials. CDC has received positive feedback from more than 2,000 recipients of the tool kit, indicating that it is well received and useful to the intended audience.

Funding researchers to address TBI among children and adolescents

CDC funds TBI research in academic institutions. Results of these projects will inform development of future

programs and policies. Examples of research include the following:

- **Measuring children's health after a TBI.** A TBI can significantly affect a child's health and development. Yet no efficient, standardized method exists to monitor the health of children who sustain a TBI. In 2001, CDC funded Johns Hopkins University to conduct a 3-year study to evaluate different methods for measuring physical and psychosocial health outcomes of children with TBI. Initial findings from this study have been published in a peer-reviewed journal. Validating and adopting a standardized health status survey that is appropriate for large-scale, ongoing surveillance of children's health following a TBI will improve understanding of how these injuries affect children. Such information will inform policy and research initiatives.
- **Developing tools to measure the effects of mild TBI.** CDC is funding a collaborative study between Children's National Medical Center in Washington, D.C., the University of Pittsburgh Medical Center Sports Medicine Concussion Program, and researchers from Dartmouth College. This study seeks to develop and validate a series of tests for assessing health outcomes of mild TBI among children, adolescents, and teens. It will also document factors that influence the outcome of a mild TBI during the recovery period

Future Steps

TBIs are a major problem with devastating consequences to injured individuals and society at large. The impact of TBI in the United States indicates a need for ongoing monitoring and dedicated prevention efforts. In response to the Children's Health Act of 2000, CDC is moving forward in the following areas:

Conducting a brain injury information center pilot study

CDC funded the Brain Injury Association of America (BIAA) in support of a pilot study to evaluate the development of a national brain

injury information center. The concept behind the information center was to provide persons with brain injury, their families, and agencies that serve them, with information on state-specific resources and available services. The "one-call" information center is being piloted in three states (Michigan, Minnesota, and Mississsippi). People in these states who call the BIAA's toll-free number will be linked automatically to their local Brain Injury Association for confidential and individualized brain injury resources in their state.

Conducting a TBI information and materials needs assessment

CDC is supporting a TBI needs assessment to determine what materials are useful to varied audiences (e.g., health care professionals, educators, patients, families and caregivers, law and policy makers, community-based organizations, and state and local agencies). The project should also provide insight into which current materials reach diverse audiences; determine deficiencies in information, training, education, and available resources; and report on and develop ways to close information and resource gaps.

Producing a concussion tool kit for youth sports

CDC's tool kit on sports-related concussions, *Heads Up: Concussion in High School Sports*, was distributed to high school athletic coaches across the United States in 2005. Encouraged by positive feedback, CDC is expanding its prevention efforts by addressing another life stage: children who participate in youth sports. The tool kit materials will be revised for youth sports athletes, their parents, and coaches. CDC convened an expert meeting of youth sports leaders and TBI experts to discuss tool kit development and will develop partnerships to ensure effective distribution. CDC will also evaluate the effectiveness of the materials in raising awareness of sports-related concussion among the target audiences.

Determining TBI prevalence in incarcerated populations

CDC is funding cooperative agreements to develop methods to determine the prevalence of TBI history in an incarcerated population. Anecdotal reports suggest that a large proportion of the prison population may have experienced one or more TBIs. The cognitive deficits that may result often are not visible, and behavioral and emotional problems associated with TBI may be attributed to other causes. Thus, prisoners with TBI or prison officials may not recognize the symptoms and may not seek or provide appropriate treatment. Better methods for identifying incarcerated persons with a history of TBI and related problems could lead to improved management of TBI in this population.

Determining prevalence of TBI-related disability among children and adolescents

CDC plans to support longitudinal research to assess disability and other outcomes, including physical, cognitive, social, emotional, behavioral, and educational, on a population or representative sample of children or adolescents from a geographically defined region or state. Currently, no such study results of TBI outcomes among these groups are available to estimate the prevalence of TBI-related disability nationwide. Estimates of children and adolescents with TBI-associated disability are necessary to document their need for services, help them return to school, and enable them to lead healthy and productive lives.

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Water-related Injuries

The Problem

- In 2002, there were 3,447 unintentional drownings in the United States, averaging nine people per day. This does not include drownings in boating-related incidents (CDC 2004a).
- In 2002, males accounted for 80% of drownings in the United States (CDC 2004a).
- Alcohol use is involved in about 25% to 50% of adolescent and adult deaths associated with water recreation (Howland et al. 1995; Howland and Hingson 1988). Alcohol influences balance, coordination, and judgment, and its effects are heightened by sun exposure and heat (Smith and Kraus 1988).
- Nearly 50% of drowning victims treated in emergency departments need hospitalization or transfer for higher levels of care compared with 3% to 5% of people treated in emergency departments for other reasons (Gilchrist et al. 2004).
- According to the U.S. Coast Guard, 703 people died in recreational boating incidents in 2003 (USCG 2003).
- Up to 70% of boating-related deaths were the result of drowning; 86% of people who drowned were not wearing personal flotation devices (USCG 2003).

CDC's Accomplishments

Research on nonfatal drownings at recreational water sites

In 2004, CDC scientists published the first national estimate of nonfatal drowning injuries treated in emergency departments in the *Morbidity and Mortality Weekly Report*. In the United States in 2001 and 2002, more than 4,100 people sought care in an emergency department each year for nonfatal drowning injuries; more than half required hospital admission or transfer for higher levels of care. Children ages 4 and younger and males of all ages were at greatest risk. The most common locations of nonfatal injuries for very young children were residential pools. Among older children, more injuries occurred in natural water settings. The study also confirmed that injuries happen most often on weekends and during summer months, when people typically enjoy water-related activities.

Report assesses effectiveness of lifeguards for drowning prevention

Most drownings occur at sites without lifeguards, according to an October 2001 CDC report. This report assessed lifeguard services as a strategy for preventing drowning and water-related injuries. Data for 1988–1997 show more than three

quarters of drownings at United States Lifesaving Association (USLA) sites (mostly ocean beaches) occurred when beaches were unguarded. In contrast, the chance of drowning at a beach where USLA-trained lifeguards are on duty is less than 1 in 18 million. These findings underscore the importance of having trained lifeguards at all beaches where people swim. This report will help communities, local government officials, and owners of private water recreational areas make informed decisions about whether to begin, retain, or discontinue lifeguard services. Additionally, the report describes some environmental modifications that can minimize injury risk. These modifications include creating slope gradients that gradually and smoothly lead to deeper water; prohibiting diving platforms and swim floats; using buoys and markers to delineate the swim area and keep boats out; and ensuring the availability of additional safety measures such as rings, buoy lines, and poles. Finally, comprehensive water safety information campaigns can educate recreational water enthusiasts about their risks and preventive measures.

Three Tragic Seconds: A childhood drowning prevention program

CDC worked with the Children's Hospital of Orange County, California, (CHOC) and the National SAFE KIDS Campaign to implement the Three Tragic Seconds program in two communities in Arizona and Florida. CHOC developed this multimedia educational program to teach parents about drowning prevention. In addition to highlighting appropriate supervision while children are in the water, the program stresses the need for multiple layers of protection (i.e., four-sided isolation fencing, pool alarms, door and gate locks, and door alarms) between small children and residential pools, or other water sites, to prevent inadvertent exposure. The National SAFE KIDS Campaign evaluated the Three Tragic Seconds program during the summer of 2003. Findings showed that at the end of the program, many participants demonstrated an increased awareness about home safety and the need for adult supervision of children. For many, the program also dispelled common myths surrounding water safety, including the inaccurate belief that air-filled toys are safety devices and the idea that swimming lessons are sufficient to prevent small children from drowning. These findings will guide development of future educational interventions for childhood drownings.

National Safe Boating Week

CDC helped promote boating safety during National Safe Boating Week 2004 (May 22–28) and 2005 (May 21–27). Boating safety is an important public health issue because more than 70 million Americans enjoy recreational boating each year. Plus, annual boat registrations have increased steadily from just over 10 million in 1988 to more than 12.8 million in 2002. During this same time, boating-related fatalities decreased, due in part to increased use of personal flotation devices (life jackets). Still, in 2003, 3,888 participants were reported injured and 703 killed in boating incidents. Among those who died from drowning, about 9 out of 10 were not wearing life jackets. The 2004 North American Safe Boating Campaign focused on raising awareness and ensuring that every person on a boat wears a life jacket. The campaign's theme was "Boat smart. Boat safe. Wear it!"

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors

Just the Facts . . .

Children and Drowning

Drowning is the second leading cause of injury-related death for children ages 1 to 14 (CDC 2004b).

- In 2002, 904 children ages 0 to 14 died from drowning (CDC 2004b).
- For every child 14 years and younger who drowns, three receive emergency department care for nonfatal submersion injuries. More than 40% of these children require hospitalization (CDC 2004b). Nonfatal incidents can cause brain damage that result in long-term disabilities ranging from memory problems and learning disabilities to the permanent loss of basic functioning (i.e., persistent vegetative state).
- Children under age 1 most often drown in bathtubs, buckets, or toilets (Brenner et al. 2001).
- Among children ages 1 to 4 years, most drownings occur in residential swimming pools (Brenner et al. 2001; Gilchrist et al. 2004). Most young children who drowned in pools were last seen in the home, had been out of sight less than five minutes, and were in the care of one or both parents at the time (Present 1987).
- During 2001–2002, the overall age-adjusted drowning rate for African Americans was 1.4 times higher than for whites. However, these rates vary by age. African-American infants under 1 year had a drowning rate only slightly higher than the rate of white infants. Among children 1 to 4 years of age, African Americans had a lower drowning rate than whites. African-American children ages 5 to 19 drowned at 2.7 times the rate of white children in this age group (CDC 2004b).

associated with water-related injuries. An example of those extramural research projects follows. For more information about this and other projects, please visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Oceanfront injury prevention.** Researchers at the Eastern Virginia Medical School are creating a community injury prevention model to reduce beach-related injury risk behavior (e.g., leaving children unsupervised, swimming during rough weather). They will develop a multifaceted education intervention by working with members of a coalition that have successfully changed behavior at the community level. Researchers will develop quantitative measures of injury risk that they will use in a pilot study conducted at a single oceanfront beach in Virginia Beach, Virginia.

Future Steps

Additional research, as demonstrated in the following examples, is needed to help answer many remaining questions about the risk factors for drowning and other water-related injuries.

- Evaluate the effectiveness of legislation (e.g., four-sided pool fencing) and community-based programs to prevent drowning.
- Assess levels of water safety knowledge and swimming ability among drowning and near-drowning victims.
- Assess levels of water safety knowledge and swimming skill among the general population and among high-risk groups.
- Describe the frequency and circumstances of water activities among the general population and among various groups.
- Assess the effectiveness of personal flotation devices.

Kids Don't Float program: Photo by Ryan Hill/Alaska Native Tribal Health

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Youth Violence

The Problem

Although homicide rates have dropped in recent years, the rates remain unacceptably high. Homicide rates for young people are higher in the United States than in other developed nations.

- In 2003, 888,508 young people ages 10 to 24 were injured from violent acts. About 1 in 12 required hospitalization (CDC 2004).
- Homicide is the second leading cause of death among young people ages 10 to 24. In this age group, homicide is the third leading cause of death for American Indians/Alaska Natives, the second leading cause of death for Hispanics and Asian/Pacific Islanders, and the leading cause of death for African Americans (CDC 2005).
- In 2002, 5,435 young people ages 10 to 24 were murdered—an average of 15 deaths each day (CDC 2004).
- In 2002, 82% of homicide victims ages 10 to 24 were killed with firearms (CDC 2004).
- Among students surveyed nationwide in a 2003 CDC study (Grunbaum et al. 2004):
  - 17.1% had carried a weapon (e.g., a gun, knife, or club) in the 30 days preceding the survey.
  - 6.1% had carried a gun in the 30 days preceding the survey.
  - 33.0% had been in a physical fight one or more times during the 12 months preceding the survey.
  - 4.2% had been injured in a physical fight one or more times during the 12 months preceding the survey and sustained injuries requiring treatment by a doctor or nurse.

CDC's Accomplishments

Academic centers link researchers and communities

Eight colleges and universities have received CDC funding to establish National Academic Centers of Excellence (ACEs) on Youth Violence. These Centers foster joint efforts between university researchers and communities to address youth violence. The primary objectives of the Centers include monitoring and tracking the problem, researching risk and protective factors, testing prevention strategies, developing multidisciplinary collaborations, providing training, and formulating community-based plans for youth violence prevention. For more information about specific programs conducted by the ACEs, visit www.cdc.gov/ncipc/res-opps/ACE/ace.htm.

National resource center offers wealth of information

The National Youth Violence Prevention Resource Center is a central source for information and materials gathered from institutions, community-based organizations, and federal agencies working to prevent violence among our nation's youth. The Center's website, toll-free hotline, and fax-on-demand service offer access to information about prevention programs, publications, research and statistics, and fact sheets. The website links parents, teens, and researchers to materials designed specifically for those audiences. Each month, the Center responds to more than 100 public inquiries and requests for technical assistance, fulfills more than 500 requests for publications and youth violence prevention materials, and hosts more than 37,000 website visitors. For more information, call 1-866-SAFEYOUTH (1-866-723-3968) or visit www.safeyouth.org.

Youth violence involves the intentional use of physical force or power (threatened or actual) against another person, group, or community that either results in or will likely result in injury, death, psychological harm, maldevelopment, or deprivation.

Multisite project evaluates prevention effort

CDC is funding a multisite trial of a violence prevention program aimed at middle school students. Thirty-seven middle schools in four states are participating. The program being evaluated teaches students conflict resolution and problem-solving skills, trains teachers about violence prevention, and engages family members in program activities. The project—affiliated with Virginia Commonwealth University, the University of Illinois at Chicago, the University of Georgia, and Duke University—represents one of the largest efforts to date to assess the effectiveness of school-based violence prevention among middle school students.

Study tracks school-associated violent deaths

With the U.S. Department of Education and U.S. Department of Justice, CDC has conducted a national study of school-associated violent deaths since 1992. The latest findings, published in the *Journal of the American Medical Association* in 2001, show 220 incidents of school violence occurred between July 1, 1994, and June 30, 1999. Most incidents were homicides involving firearms. While the number of incidents has decreased steadily since 1992, multiple-victim incidents have increased. This study plays an important role in monitoring trends in school violence, identifying risk factors for school violence, and assessing the effects of prevention efforts.

Reporting system to provide objective, timely violence data

State and local agencies acquire detailed information from medical examiners, coroners, police, crime labs, and death certificates that could answer fundamental questions about violence trends and patterns. However, the information is fragmented and difficult to access. CDC has funded 17 states—Alaska, California, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wisconsin—to establish the National Violent Death Reporting System (NVDRS) to gather, share, and link state-level data about violence. When fully implemented, NVDRS will enable CDC to pull together vital

state-level information to gain a more accurate understanding of violence and to enable policy makers and community leaders to make informed decisions about violence prevention strategies and programs, including decisions that address youth violence.

Sourcebook guides community efforts to prevent youth violence

Best Practices of Youth Violence Prevention: A Sourcebook for Community Action was published in 1999 to help communities develop and implement youth violence prevention programs. The sourcebook presents four key strategies for preventing youth violence: school-based programs, mentoring programs, parenting and family-based programs, and home visitation. The sourcebook builds on lessons learned from the first CDC-funded evaluation projects and draws on the expertise of more than 100 of the nation's leading scientists and practitioners. *Best Practices* is also available in Spanish.

Sociocultural and community risk and protective factors for child maltreatment and youth violence

CDC is funding researchers at the University of Georgia to examine the sociocultural and community risk and protective factors associated with child maltreatment and early risk factors for youth violence. Previous research has described the importance of such factors as access to social capital, community social organization, economic and family resources, residential instability, and community and family violence. However, limited information is available about how these and other risk and protective factors might affect child maltreatment and the early developmental risk factors for youth violence. The results from this research will inform the development of violence prevention strategies for communities.

Assessing links between various forms of violence

CDC is conducting a study to identify the links between different forms of violent behaviors among adolescents. The findings will help scientists understand the prevalence and consequences of different types of aggressive behaviors; the association between dating violence and other forms of peer violence; and the manner in which these types of violent behaviors vary by sex, developmental stage, and other factors.

Youth violence prevention through community-level change

CDC is funding the University of Michigan to evaluate the Youth Empowerment Solutions for Peaceful Communities (YES) project. The project aims to reduce rates of youth violence in communities through interventions designed to change community structures and social processes. The YES project provides opportunities for youth that will prevent or reduce youth violence and initiate positive community change. For example, YES helps neighborhood organizations engage youth in activities that focus on changing their social and physical environments.

Assessment tool for school environments

CDC is supporting the development of a tool to assess the physical characteristics of schools that can contribute to feelings of safety, increase prosocial behavior, and decrease aggressive behavior. The tool uses the Crime Prevention Through Environment Design (CPTED) framework. The core principles of CPTED are to reduce opportunities for crime, to enhance natural surveillance of activities, and to reinforce a sense that the environment is cared for and that problems will be addressed.

Compendium of assessment tools

CDC has updated *Measuring Violence-related Attitudes, Behaviors, and Influences Among Youths: A Compendium of Assessment Tools.* The compendium provides researchers and prevention specialists with measures to assess the factors associated with youth violence and to evaluate prevention programs. This publication may be ordered online at www.cdc.gov/injury.

Preventing Violence through Education, Networking, and Technical Assistance (PREVENT)

CDC is funding the University of North Carolina Injury Prevention Research Center to develop a national training program for violence prevention practitioners. The initiative, PREVENT, is an outgrowth of the National Injury and Violence Prevention Training Initiative. It is supported by the Society for Advancement of Violence and Injury Research (formerly the National Association of Injury Control Research Centers) and the State and Territorial Injury Prevention Directors Association. PREVENT helps individuals and organizations build skills to identify community needs and assets; to create and mobilize partnerships; to develop and implement prevention programs; to measure success; and to fund and sustain programs. PREVENT uses many educational methods including distance-learning modules, regional workshops, action learning projects, coaching, and an intensive institute.

Association between exposure to media violence and youth violence

CDC is funding Internet Solutions for Kids, Inc., in Irvine, California, and the University of Michigan to study how media violence, particularly violence in new media such as the Internet and video games, affects youth violence. Researchers are examining

Just the Facts . . .

Key Risk Factors for Youth Violence

Using the public health approach, one of the first steps toward preventing violence is to identify and understand the factors that place young people at risk for violent victimization and perpetration. Research shows that some individual and social factors can increase the probability of violence during adolescence and young adulthood:

Individual

- History of early aggression
- Beliefs supportive of violence
- Social cognitive deficits

Family

- Poor monitoring or supervision of children
- Exposure to violence
- Parental drug or alcohol abuse
- Poor emotional attachment to parents or caregivers

Peer/School

- Association with peers engaged in high-risk or problem behavior
- Low commitment to school
- Academic failure

Neighborhood

- Poverty and diminished economic opportunity
- High levels of transience and family disruption
- Low community participation

the association between exposure to media violence and serious violent behavior, assessing the aspects of media that contribute to the risk of violence, and identifying factors that mediate or moderate the association between media violence and violent behavior.

Enhancing State Capacity to Address Child and Adolescent Health Through Violence Prevention (ESCAPe)

CDC's ESCAPe program is designed to develop capacity and leadership in preventing all types of youth violence. The planning and implementation phases of this project will address shared risk and protective factors. To date, Colorado, Iowa, Massachusetts, Michigan, Minnesota, New Mexico, Rhode Island, and Virginia have received funding.

Social and character development research program

CDC and the U.S. Department of Education have launched a social and character development research program. Researchers are evaluating the effectiveness of interventions designed to promote positive social and character development, increase positive behaviors, and reduce antisocial behaviors among elementary school children.

Collaboration with other parts of CDC

CDC's Injury Center has worked with the Division of Adolescent and School Health (DASH), part of CDC's National Center for Chronic Disease Prevention and Health Promotion, on projects related to youth violence. Examples of this collaboration follow:

- **School Health Guidelines to Prevent Unintentional Injuries and Violence.** State and local educational agencies and schools use these guidelines to promote safety and to teach students the skills needed to prevent injuries and violence. The components for a coordinated school health program are addressed for all grade levels. Specialists from universities and from national, federal, state, and local agencies and organizations collaborated to develop the guide. Development was based on in-depth review of research, theory, and current practice in unintentional injury, violence, and suicide prevention; health education; and public health. The guidelines are available at www.cdc.gov/healthyyouth/injury/guidelines.
- **Healthy Passages.** Healthy Passages is a multiyear longitudinal study to help families, schools, communities, and health care providers understand how children grow to be healthy, educated, and productive members of society. The study will help explain why young people make choices that lead to healthy or risky behaviors. Data collection, which began in fall 2004, will provide information about varied injury and violence issues including individual and family factors associated with bullying and how behaviors change over time.
- **Youth Risk Behavior Surveillance System.** CDC's Youth Risk Behavior Surveillance System (YRBSS) monitors priority health risk behaviors that contribute to the leading causes of death, disability, and social problems among adolescents and adults in the United States, including behaviors that contribute to unintentional injuries and violence. The YRBSS consists of national, state, and local school-based surveys of representative samples of 9th through 12th grade students. The surveys, conducted biennially, provide information on varied suicide- and interpersonal violence-related behaviors both on school property and in the community.

- **School Health Policies and Programs Study (SHPPS).** This national survey is conducted periodically to assess school health policies and programs at state, district, school, and classroom levels. SHPPS was first conducted by CDC's Division of Adolescent and School Health (DASH) in 1994 and was repeated in 2000. SHPPS provides information about health education, programs, environmental strategies, and policies that states, districts, and schools use to address violence and suicide prevention.
- **School Health Index.** This self-assessment and planning tool enables schools to identify the strengths and weaknesses of its health and safety policies and programs; develop an action plan for improving student health and safety; and involve teachers, parents, students, and the community in improving school services. The third edition of the School Health Index, including unintentional injury and violence prevention items, is available at www.cdc.gov/nccdphp/dash/SHI/index.htm.

CDC extramural research grants

CDC provides grant funding to researchers at universities, medical institutions, and community-based organizations to study various factors related to youth violence. A sample of those extramural research projects follows. For information about these and other projects, please visit www.cdc.gov/ncipc/res-opps/extra.htm.

- **Intentional injury among urban youth.** Harvard University researchers are studying 5,000 males and females, ages 2, 5, 8, 11, 14, and 17, residing in 80 neighborhoods in Chicago. These children and their caregivers will be assessed twice during home-based sessions to determine the source, frequency, and severity of intentional injury and the consequences of such injury on their physical, psychological, social, and academic functioning. Participants will also be interviewed about gun ownership (self and family), gun carrying, and reasons for gun ownership. These data are being collected as part of an ongoing study of the neighborhoods, schools, families, and personal risk factors for violence.
- **Youth employment and youth violence.** Is work a viable intervention? Researchers at the University of North Carolina at Chapel Hill are examining whether youth employment has promise as a potential intervention to reduce youth violence. This project uses data collected from the National Longitudinal Study of Adolescent Health, based on a nationally representative sample of more than 10,000 adolescents who completed in-home interviews over a six-year period. Investigators are examining the relationship between employment during adolescence and violent (i.e., assault, fighting, threatening with weapons) and violence-related behaviors (i.e., drug and alcohol use, stealing, weapon carrying, gang membership).

Future Steps

CDC has identified promising interventions to prevent youth violence; however, more strategies are needed for community-level interventions. CDC must continue to build on the prevention knowledge base by identifying the best ways to disseminate and encourage adoption of effective strategies.

CDC's experience in studying suicide, family violence, and youth violence provides a unique environment for understanding the shared factors contributing to different forms of violence. CDC and its partners must examine these common links to develop broad prevention strategies.

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