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Top 20 violence and injury practice innovations since 1992☆

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Abstract

This article presents what the authors consider to be among the top 20 practice innovations since the inception of the National Center for Injury Prevention and Control in 1992. The innovations embody various characteristics of successful public health programs and have contributed to declines in violence, motor vehicle, residential fire, and other injury rates over the past 20 years. Taken together, these innovations have reduced the burden of violence and injury and have influenced current practice and practitioners in the United States and worldwide.

Keywords

Injury prevention; Innovation; Implementation; Violence prevention; Prevention spectrum

1. Goal Of The Paper

To present the top 20 practice innovations in violence and injury prevention since the founding of the National Center for Violence and Injury Prevention and Control in 1992.

2. Introduction

Since 1992, when the Centers for Disease Control and Prevention established the National Center for Injury Prevention and Control (NCIPC) numerous violence and injury prevention innovations - practices, programs, polices, or other interventions – have been implemented. For simplicity, this article will refer to all of these prevention approaches as “innovations.”

This article presents what the authors consider to be among the top 20 practice innovations since the inception of NCIPC. The innovations embody various characteristics of successful public health programs (see below for criteria) and have contributed to declines in violence, motor vehicle, residential fire, and other injury rates over the past 20 years. While this article

☆The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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celebrates the accomplishments of these prevention strategies, much work remains to be done. Violence and injury continues to be the leading killer of young people in the United States.We hope that the lessons learned from a review of these 20 innovative strategies will continue to inform prevention practices in the United States and around the world.

Two caveats warrant consideration. First, the intent of this effort was to highlight 20 innovative approaches that have changed how we conceptualize and deliver prevention practices in real-world settings. The list represents this aim and is intended to stimulate thought rather than provide a scientific determination of everything “that works” in violence and injury prevention (VIP). Second, the framework used to examine the strength of an innovation’s prevention characteristics (Cohen & Swift, 1999) was designed to stimulate the building of comprehensive violence and injury prevention interventions. We found it to be a useful heuristic device, and modified it to accommodate the broader issues relevant to VIP and infrastructure building programs.

3. Framework For Discussing Innovations

Cohen and Swift (1999) propose the Spectrum of Prevention (the Spectrum). At its core, the Spectrum is a comprehensive framework for building violence and injury prevention interventions that promotes an integrated approach across practitioners, policy makers and the larger society. The Spectrum consists of six elements (Table 1) that span the socioecological model, moving from individuals and families, to community norms, institutional practices, and ending with policy changes. Cohen and Swift developed this approach after recognizing that violence and injury problems are complex and require holistic solutions that incorporate all elements presented in Table 1. To the original six elements, we have added infrastructure as prevention efforts require data systems, organizational capacity, and funding to be successful.

4. The Top 20 List

This list is not a hierarchical ordering. Instead, the order reflects a general grouping of similar strategies. Innovations 1–3 are primarily science-to-practice translations that rely on communications strategies. Interventions 4–10 are based on direct engagement of partners to implement the interventions. Items 11–17 describe effective ways to reduce death and injury due to transportation. Innovations 18 and 19 are related to data and how we learn about violence and injury problems. Lastly, item 20 describes training and research. All of these innovations demonstrate elements of the Spectrum (Table 2).

4.1. Translating Science to Practice with Communication Tools & Resources

The first four items in our list describe promising, innovative, and effective communication strategies for disseminating effective programs to the field. The strategies leverage newer technologies, such as pod-casts and smartphone apps, as well as more established media such as webpages and printed documents. Taken together, these innovations demonstrate that innovative communication practices utilize all elements of the Spectrum

4.1.1. 1. Heads Up Initiatives—*Heads Up* is a branded collection of communications initiatives designed to reach those who play sports, those who coach, and those who work with athletes outside of sports (e.g., teachers, school nurses, and health care practitioners). The goal is to provide this broad spectrum of audiences with the information and resources they need to handle concussions: whether suffering from one, recognizing it, or treating it. Given that concussion is one of the fastest growing medical diagnoses in the United States, the necessity of *Heads Up* cannot be underestimated (Covassin, Elbin, & Sarmiento, 2012). The campaign uses a broad spectrum of media sources tailored to specific audiences including printed *Heads Up* materials for sharing and posting in schools, a website, and social media, including Twitter and Face Book (Sarmiento, Mitchko, Klein, & Wong, 2010). There are over 85 organizations partnering with CDC for these initiatives. For more information visit: http://www.cdc.gov/concussion/HeadsUp/youth.html.

4.1.2. 2. Field Triage and Advanced Automatic Crash Notification—At the scene of an injury, Emergency Medical Service (EMS) providers must identify the severity and type of injury, and determine which hospital or other facility would be the most appropriate to meet the needs of the patient, a process called Field Triage. To assure that patients are transported to the appropriate level trauma center, CDC along with the National Highway Traffic Safety Administration and the American College of Surgeons published the *Guidelines for Field Triage of Injured Patients, Recommendations of the National Expert Panel on Field Triage* in 2009 and then revised in 2011 (CDC, 2012a). These guidelines have resulted in a 25% reduction in deaths for severely injured patients who received care at a Level I trauma center rather than at a non-trauma center (MacKenzie et al., 2006). These guidelines, thus change individual knowledge, while influencing organizational policy. To download the full guidelines visit: www.cdc.gov/mmwr/pdf/rr/rr5801.pdf.

Another way to improve correct triage is to use data from crashes. By using a collection of in-vehicle sensors, vehicle telemetry systems like Advanced Automatic Crash Notification (AACN) send crash data to an advisor if a vehicle is involved in a moderate or severe front, rear, or side-impact crash. Depending on the type of system, the data include information about crash severity, the direction of impact, air bag deployment, multiple impacts, and rollovers (if equipped with appropriate sensors). Advisors can relay this information to emergency dispatchers, helping them to quickly determine the appropriate combination of emergency personnel, equipment, and medical facilities. The result is better prediction of severity of injury, decreases response times, improved field triage, ultimately resulting in decreased time for patients to receive trauma care. AACN represents both changing organizational practices and the infrastructure element of the Spectrum.

4.1.3. 3. Connecting and Training Practitioners Online—Reaching practitioners online is now essential. Two major efforts within NCIPC's Division of Violence Prevention have expanded our reach to practitioners and accelerated access to information and education.

Engaging individuals, the community and building networks are three elements of the Spectrum well represented by NCIPC's **VetoViolence** program. Launched in 2009, VetoViolence (www.vetoviolence.org) is an online resource for violence education, training,

and tools for violence practitioners and others interested in learning more about violence prevention. Currently, VetoViolence is an evolving repository of training and resources rich with imagery, animation, and video. **Principals of Prevention (POP)**, for example, outlines the fundamental building blocks of effective violence prevention including the concepts of primary prevention, the social-ecological model, and the public health approach to primary prevention. VetoViolence was selected from 6,000 entries to receive a 2011 Gold Communicators Award of Excellence by the International Academy of the Visual Arts in the "social responsibility interactive Web site that promotes or draws awareness to social issues" category.

NCIPC also funds three National Resource Centers to take advantage of new media and information technology for the creation of communities of practice focused on intimate partner and sexual violence prevention. Based at the California Coalition Against Sexual Assault, ***PreventConnect*** builds communities of practice among prevention practitioners (http://preventconnect.org/). Tweets, posts, podcasts, webinars and online dialogues are all part of exchanging ideas and building practice-based evidence. ***The National Online Resource Center on Violence Against Women***, known as *VAWnet*, is a comprehensive online collection of resources on domestic and sexual violence, (http://www.vawnet.org/). ***The National Sexual Violence Resource Center*** (www.nsvrc.org) is the nation's principle resource center on sexual violence with both online and in-person services. Together, these are promising practices for communicating with the violence prevention community by creating a web-space for both education and communication.

4.2. Innovative Programs

By programs, we mean interventions that are delivered in practice settings by a variety of public health partners. Such programs offer the direct delivery of public health interventions to reduce violence and injury across settings. As mentioned by Cohen and Swift, the primary goal in violence and injury prevention is primary prevention–that is, preventing a problem before it ever starts. In public health lingo, these programs have found creative ways to "move upstream," thereby addressing early root causes and risk factors that lead to violence, injury, disability, and death.

4.2.1. 4. Smoke Alarm Installation and Fire Safety Education (SAIFE) Program—

Since 1998, the CDC has funded smoke alarm installation programs in high-risk communities with fire death rates higher than state and national averages and median household incomes below the poverty level. In addition, CDC's Smoke Alarm Installation and Fire Safety Education (SAIFE) programs target households with children (age≤5 years) and older adults (age ≥65 years). This program involves recruiting local communities and community partners, hiring a local coordinator, canvassing neighborhood homes, installing long-lasting lithium-powered smoke alarms, and providing general fire safety education and 6-month follow-up to determine alarm functionality. Local fire departments are vital community partners in delivering this program. Since the program's inception, roughly 553,000 smoke alarms have been installed in more than 278,500 high-risk homes. Approximately 3,755 lives have potentially been saved as a result of a program alarm that provided early warning to a dangerous fire incident. This prevention strategy was highly

successful because practitioners refined the approach over time, incorporating insights about the importance of *installation* (as opposed to a "give away" program) and the pivotal role of a key community partner – local fire departments. See http://www.cdc.gov/HomeandRecreationalSafety/Fire-Prevention/smoke_alarms.html for more information.

4.2.2. 5. Advances in Youth Violence Prevention– UNITY—The UNITY initiative (Urban Networks to Increase Thriving Youth) is a national initiative to prevent violence in the first place. UNITY works closely with U.S. cities to ensure that comprehensive prevention strategies and a public health approach are effectively integrated into local efforts. UNITY builds capacity through training and consultation, and by cultivating a vibrant network so cities can share valuable lessons and support each other in this work. UNITY tools and resources present both the research and practitioner wisdom on preventing violence to a broad array of stakeholders in cities and at the national and state levels. UNITY also informs decision-makers about success stories and the value of the prevention approach. In addition to a focus on effective policies and programs, UNITY has helped expand the discourse around preventing violence to include key infrastructure elements, such as community engagement, local leadership, strong partnerships, and data and evaluation systems, for example. For more information, visit http://preventioninstitute.org/unity.

4.2.3. 6. Moving Upstream in Sexual and Intimate Partner Violence Prevention – RPE and DELTA—Following the recommendations made by Cohen and Swift (1999), work in intimate partner and sexual violence prevention has moved upstream: stopping the perpetration of violence before it ever starts. During the past 10 years in particular, two of NCIPC's flagship programs have contributed greatly to a national shift from focusing mostly on victim-services to greater emphasis on stopping perpetration.

The Rape Prevention Education Program (RPE) and The Domestic Violence Prevention Enhancement and Leadership Through Alliances Program(DELTA) aim to increase primary prevention of intimate partner (IPV) and sexual violence (SV) through capacity-building in states and communities. The RPE program strengthens sexual violence prevention efforts in all 50 U.S. states and territories through a continuum of prevention activities. For the past 10 years, CDC has administered RPE funds to state health departments, who in turn disburse funds to state sexual violence coalitions and local agencies. Started at CDC in 2002, DELTA funds 14 state domestic violence coalitions to build state and local capacity for IPV primary prevention through established community coordinated response units. From 2008–2011 The Robert Wood Johnson Foundation through the CDC Foundation partnered with CDC to fund DELTA PREP. This project added provided supports and funds to 19 additional state domestic violence coalitions to integrate primary prevention in their organization to accelerate state and local prevention strategies. These programs are innovative because they demonstrate the full breadth of the Spectrum, including infrastructure. Moreover, they also are a result of multiple iterations through the spectrum, moving from individual and community level to policy, and then back to the community level.

4.2.4. 7. Engaging Boys and Men to Prevent Violence Against Women—Collectively, the programs in item 6 leverage the strengths of practitioners as field experts and catalysts for social action. They also have built essential infrastructure to support and

deliver prevention strategies with the greatest potential for broad impact. For example, several approaches to engaging boys and men as part of the solution to violence against women, and prevention more broadly, have emerged from practice and have been fostered through partnerships with CDC, research institutes and national organizations.

These approaches include, but are not limited to: (a) ***Coaching Boys to Men*** (http://www.futureswithoutviolence.org/content/features/detail/811/); (b) ***Men of Strength Clubs*** (http://www.mencanstoprape.org/The-Men-of-Strength-Club/); and, (c) organizations such as ***Men Stopping Violence*** (http://www.menstoppingviolence.org) and ***MensWork*** (http://www.mensworkinc.com). Although their potential for influencing gender norms that contribute to violence should be balanced with careful examination of their implementation and impact, working with boys and men is now integral to violence prevention practice and greatly expands partnerships working on primary prevention.

In addition, strategies currently used by practitioners may have promise for broad impact because they address social conditions, norms, and behaviors aimed at stopping perpetration and often target known risk and protective factors.

More information on all three programs can be found at: http://www.cdc.gov/ViolencePrevention/intimatepartnerviolence/index.html and http://www.cdc.gov/ViolencePrevention/sexualviolence/index.html.

4.2.5. 8. Universal School-Based Programs to Prevent Violence— Universal, school-based programs intended to prevent violent behavior are delivered to all children in a particular grade or school, regardless of prior violence or risk of violence. What makes these programs fit within “moving upstream” is their focus from kindergarten through high school to address early cognitive and emotional mechanisms, social skills, and behaviors associated with violence. CDC’s Task Force on Community Preventive Services systematically reviewed 53 studies of school-based programs and found that all reviewed programs reduced violence behavior regardless of focus (i.e., cognitive/affective, social skills building) (CDC, 2007) and strategies seemed to reduce violent behaviors across all school environments, regardless of socioeconomic status or crime rates. Given the variety of programs delivered, school-based strategies have potential to be widely implemented to greatly reduce violent behaviors early in life and prevent violence in adulthood. For more information visit: http://www.thecommunityguide.org/violence/schoolbasedprograms.html and http://www.colorado.edu/cspv/blueprints/.

4.2.6. 9. Positive Parenting Program – Triple P—CDC’s overall strategy to prevent child maltreatment is to promote safe, stable, and nurturing relationships (SSNRs) between children and their caregivers. Studies have shown that parents’ access to parenting information and support reduces the risk for child maltreatment (CDC, 2012b). Triple P is a system of interventions that range in intensity (e.g., media messages, brief consultations or seminars, intensive family services) to address differing needs of individual families. A multi-level parenting and family support system, Triple P seeks to prevent developmental, emotional, and behavioral problems in children. They achieve this through enhancing knowledge, skills, and confidence of parents. Substantial evidence supports Triple P’s

effectiveness at promoting positive parenting behaviors and addressing child behavior problems (Nowak & Heinrchs, 2008; Thomas & Zimmer-Gembeck, 2007). More recently, Triple P has been shown to be effective at reducing child maltreatment-related injuries and out-of-home placements (Prinz, Sanders, Shapiro, Whitaker, & Lutzker, 2009) with modest costs per child when implemented as a system on a broad scale. The Triple P America website (http://www.triplep-america.com/index.html) provides information on the Triple P system.

4.2.7. 10. Business Improvement Districts (BIDs) to Reduce Violence—

Community-based approaches have a long and celebrated history in public health, but the effectiveness of such strategies for violence prevention often remains undocumented. Fortunately, researchers at RAND have identified business improvement districts or “BIDs” as an effective way to reduce rates of crime and violence in urban settings. BIDs are grassroots, self-organizing public-private organizations that provide economic development opportunities within communities. They collect assessments from local business merchants or property owners, and the assessments are then used to invest in local-area service provisions and activities, such as place promotion, street cleaning/beautification, and public safety. MacDonald, Golinelli, Stokes, and Bluthenthal (2010) found that implementation of BIDs was associated with significant reductions in violent crimes. For example, there was a 12% drop in robbery rates after the BIDs were implemented, and an 8% drop in violent crime overall. BIDs were also associated with 32% fewer police arrests over time, suggesting that the decreases in crime were not due to increased police activity. A cost analysis found that investments in BID neighborhoods resulted in cost savings due to reduced crime rates, reduced arrests, and lower prosecution-related expenditures. This innovative strategy promises to leverage public-private partnerships to great purpose – keeping our children and communities safe from violence.

4.3. Motor Vehicle & Transportation Policy Innovations

Deaths and injuries from motor vehicles are a significant burden on the United States and around the world. In fact, motor vehicle crashes are the leading cause of death in the United States among those aged 5–34 (CDC, 2012c). The following interventions have significant scientific evidence to support their ability to reduce the burden of death and injury related to motor vehicle crashes.

Items 11 through 14 discuss successful approaches to reducing the burden of alcohol impaired driving. In 2009, alcohol-impaired driving caused 10,839 in the United States, account for approximately 1/3 of all motor vehicle fatalities (National Highway Traffic Safety Administration [NHTSA], 2010); however, alcohol-impaired driving fatalities as a percentage of all motor vehicle fatalities decreased from 1982 to 1999 but have remained stable since (Bergen, Shults, Beck, & Qayad, 2012).

Items 15 and 16 discuss the effectiveness of occupant restraints for both adults (#15) along with infants and children (#16). Restraints are highly effective at reducing injury and death, thus we include them here. Item 17 discusses the special case of teen drivers who tend to be involved in more crashes and have lower seatbelt use than other age groups.

4.3.1. 11. 0.08 Blood Alcohol Concentration Laws—There is significant evidence that establishing the legal blood alcohol concentration (BAC) of 0.08 g/dL for drivers aged 21 years and older saves lives. Shults et al. (2001) found that reducing the legal blood alcohol limit from .1 to .08 results in lower annual alcohol related motor vehicle fatalities by about 7% (interquartile range −15% to −4%), which translates into about 400–600 lives per year. In terms of actual drinks, .08 g/dL is equivalent to a 170 pound man having four drinks in one hour on an empty stomach, or three drinks in a woman of 135 pounds (Mercer et al., 2010). Changing the legal limit of intoxication provides a pathway for changing social norms about appropriate alcohol consumption behaviors. At the same time, reducing the legal limit will result in fewer alcohol-related motor vehicle crashes and deaths.

4.3.2. 12. Sobriety Checkpoints—The Community Guide (Guide to Community Preventive Services, 2010a) recommends sobriety checkpoints as an effective strategy for reducing alcohol-related motor vehicle crashes. At sobriety checkpoints, law enforcement officers use a system to stop drivers to assess their level of alcohol impairment. There are two types of sobriety checkpoints: (a) random breath testing (RBT) checkpoints where officers randomly select and test drivers for blood alcohol levels; and (b) selective breath testing (SBT) checkpoints where officers must have reason to suspect a driver has been drinking before testing. SBT is the only type of sobriety checkpoint used in the United States. RBT checkpoints are effective in decreasing alcohol-related motor vehicle crashes by 18%. SBT checkpoints reduce rates by 20%. Similarly, fatal crashes involving alcohol are reduced by 22% for RBT, and decreases of 26% and 20% for SBT checkpoints (Elder et al., 2002; Shults et al., 2001). It appears that checkpoints work because they change the perceived risk of driving while under the influence. Checkpoints are most effective when advertised. This appears to cause social drinkers to either reduce the amount they consume or not drive during checkpoint periods.

4.3.3. 13. Ignition Interlocks—Driving While Intoxicated (DWI) is a significant public health risk; with 32% of all fatal motor vehicle deaths in 2008 involved an alcohol-impaired driver (Mercer et al., 2010). One way to handle repeat DWI is the installation of Ignition interlocks (ILs) in convicted drivers' cars. ILs are mechanical devices that require drivers to blow into a breathalyzer like device in order to start their vehicle. The Cochrane review of ILs (Willis, Lybrand, & Bellamy, 2004) indicates that they are very effective at reducing re-arrest. When ILs are installed, re-arrest rates decrease by about 67%. Conversely, when the ILs are removed re-arrest rates revert back to the norm. Along with reducing re-arrest, ILs also are effective at reducing alcohol related crashes. ILs have a societal benefit in that they allow convicted drivers to continue driving; thus, providing resources (e.g., income and transportation) to their families.

4.3.4. 14. Occupant restraint: airbags—Occupant restraints, (airbags and seatbelts), are safety features within motor vehicles that protect occupants during a crash. Active restraint systems, such as seatbelts, require the user to perform certain steps (e.g., fasten seat belt), whereas passive restraints, such as air bags, do not require passengers to act (Governors Highway Safety Association [GHSA], 2012). Since 1998, driver and passenger air bags have been mandatory equipment in all passenger cars. Requirements for light trucks

and vans followed in 1999. Several studies have examined the effectiveness of airbags in reducing mortality from passenger-car collisions. Crandall, Olson, and Sklar (2001) found that airbags alone reduce mortality in head-on passenger car collisions by 63%. When combined with seat belts the reduction is 82%. Similarly, Williams et al. (2008) found that airbags alone were associated with reduced injury to the brain, face, cervical spine, thorax, and spine. When used in combination, airbags and seatbelts substantial reduce morbidity from head-on collisions. Furthermore, Williams et al. found that airbags reduced in-hospital mortality, infectious morbidity, and overall costs from hospitalization due to a collision.

4.3.5. 15. Child Passenger Restraint Seats—In the United States during 2009, 1,314 children ages 14 years and younger died as occupants in motor vehicle crashes, and approximately 179,000 were injured (U.S. Department of Transportation, National Highway Traffic Safety Administration [NHTSA] (2010)). Child safety seats are highly effective. When used properly, infant seats reduce the risk of death by 70%. Risk reductions for toddlers aged 1–4 are between 47% and 54% (Task Force on Community Preventative Services: Child Safety Seats), while children 4 to 7 years old have their risk reduced by 59% (Committee on Injury, Violence and Poison Prevention, 2011). The key, however, is installing and using these seats properly. The Community Guide (Guide to Community Preventive Services, 2010b) recommends several interventions to encourage proper installation and consistent use of these devices. These interventions include: (a) laws mandating use; (b) Community-wide information programs; (c) Distribution and education programs; and (d) Incentive and education programs. This four-pronged strategy is a good example of the Spectrum of Prevention in that they change behaviors and norms from the individual through the societal levels.

4.3.6. 16. Graduated Driver Licensing—Though youth ages 15–24 represent 14% of the U.S. population, they account for 30% and 28% of total motor vehicle injury costs among males and females respectively (CDC, 2012c). Males, teens driving with teen passengers, and newly licensed teens are at an increased risk for motor vehicle crashes. Programs have been introduced and proven effective in helping improve teen driver safety. One such initiative is the graduated drivers licensing (GDL) system, which allows teens to initiate their driving experience in low-risk conditions while delaying full licen-sure. To ease teenage drivers onto roadways, control their exposure to advanced driving situations such as nighttime, and reduce high-risk (distracted) driving, the GDL system uses three gradual steps (stage 1=learner's permit; stage 2=provisional license; and stage 3=full license). Numerous studies have found significant decreases in teen driving fatalities among states that have implemented GDL (GHSA, 2012). The results from a recent national evaluation of GDL demonstrate that GDL laws are strongly associated with reductions in teenager crashes (Williams, 2012).

4.3.7. 17. Bicycle Helmets Ordinances—Bicycle crashes account for about 2% of all traffic fatalities in 2010 (National Highway Traffic Safety Administration [NHTSA], 2012). About 75% of these fatalities are the result of head injuries (Insurance Institute for Highway Safety [IIHS], 2010). Fortunately, evidence suggests that a simple policy solution – the use of helmets – can reduce the chance of fatality due to a head injury by about 85% and 65%

in serious head injury among children (Thompson, Rivara, & Thompson, 1989). Helmets are also found to be effective at reducing upper head and facial injuries (Attewell, Glase, & McFadden, 2001; Finvers, Strother, & Mohatdi, 1996). When laws mandate their use, Rogers (2002) found an 18.4% increase in helmet use by those under the age of 16. Bicycle helmet legislation coupled with community-based efforts (e.g. bicycle rodeos) change the norms of helmet wearing. As more children believe that helmet wearing is appropriate, the number of pediatric cases of head trauma from a bicycle crash will continue to reduce. However, despite the effectiveness of helmets and ordinances requiring their use, there is currently no universal helmet law in the United States.

4.4. Training & Infrastructure Development

To reduce the burden of violence and injury, the United States needs trained researchers and practitioners. The three innovations presented here have provided data, practitioners, and created changes in social norms that have reduced this burden.

4.4.1. 18. Surveillance/e-coding—Injury surveillance capabilities have greatly advanced over the past 20 years. Both the increased availability of data with external cause of injury coding and the standardization of analysis practices have contributed to these gains. The Recommended Framework for Presenting Injury Mortality Data was first published in 1997 (CDC, 1997). That first framework combined with the ICD-9-CM Framework for Presenting Injury Morbidity Data organized ICD-9 and ICD-9-CM data by external cause and intent codes. Similarly the ICD-10 Framework: External Cause of Injury Mortality Matrix provides a standardized analysis structure for ICD-10 coded mortality data (NCHS, 2002). These frameworks were quickly adopted by injury epidemiologists. Today, in addition to many other applications, the frameworks form the basis for the WISQARS data query system (CDC, 2012c) and the State Injury Indicators (Thomas & Johnson, 2012) analysis structure. This innovation fits into the Spectrum because it fills the infrastructure need, but also is the base element through which individual knowledge is increased, as well as providing the data for developing organizational practices, and informing policy decisions.

4.4.2. 19. WISQARS—As e-coding provides the data, this next innovation is a system through which e-coding (see #18 above) can be accessed for all 50 states. Understanding the burden of violence and injury in the United States is a critical part of designing, implementing, and evaluating innovations. CDC's WISQARS™ (Web-based Injury Statistics Query and Reporting System) is an interactive, online database that fills this critical need. Specifically, WISQARS provides fatal and nonfatal injury, violent death, and cost of injury data from a variety of trusted sources. Researchers, the media, public health professionals, and the public can use WISQARS™ data to learn more about the public health and economic burden associated with unintentional and violence-related injury in the United States.

To date, WISQARS is the only system in the United States that compiles these data and makes it available to the public at no cost. Reports can be generated for geographic region (national, regional, and state), mechanism (cause), body region, nature or type of injury, and by sex, race/ethnicity, and age of the injured person. Practitioners use these

reports to demonstrate the size of the public health and economic impact of the injury problem, identify new or developing injury problems, identify persons at risk, and provide surveillance data for program and policy decisions.

WIQARS can be accessed at: www.cdc.gov/injury/wisqars/.

4.4.3. 20. Injury Control and Research Centers—This innovation demonstrates the cross-cutting and multidisciplinary focus of the Spectrum. Specifically, the CDC funded Injury Control Research Centers (ICRCs) provide cross cutting and integrated outreach, training, and research in the field of injury and violence prevention and control. The centers strive to strengthen VIP infrastructure by integrating resources at the local, state, and national levels. These comprehensive centers actively train the next generation of VIP researchers as well as train community members on how to reduce the burden of violence and injury. They do so through varied training methods, including classroom instruction, summer institutes, and community outreach programs. Since 1992, the CDC-funded ICRCs have trained thousands of researchers and professionals. They have produced over 4,600 peer-reviewed publications and numerous public health messages and media products. In closing, the ICRCs have produced many of the current researchers and health professionals working in VIP, and will continue to do so. Furthermore, the ICRCs have provided critical data and interventions to reduce the burden of violence and injury in the United States.

5. Discussion

These 20 highlighted innovations span the breadth of the Spectrum of Prevention. All 20 exhibit all seven elements to some degree. The first 10 innovations focus on education of individuals, practitioners, and how to use that knowledge to build coalitions. These coalitions then influence Organizational Practices and Influence Policy. The transportation innovations (#s 11–17) focus on policy changes that, in turn, change individual behaviors. However, the policy changes were enacted because the first five elements of the Spectrum occurred *prior* to the policy change. That is, 11–17 represent the last part of the Spectrum, but occurred because other elements happened, in part, prior to 1992. This is not to say that further work in transportation is needed at all levels of the Spectrum; rather, these innovative policies have demonstrated some degree of effectiveness for reducing the burden of transportation injury in the United States. The last three innovations focus on the infrastructure for preventing violence and injury. E-coding and WISQARS provide the critical data for understanding the problem. At the same time, this data can be used to begin the process of changing social norms, while recognizing norms are not changed by data alone. Innovation 20 is a national-level training program for VIP. Without this training, practitioner norms will be slower to change. At the same time, the ICRCs work to change Organizational Practices and Influence Policy formation.

Given our understanding of the key characteristics of effective VIP programs, NCICP developed the Core Violence and Injury Prevention Program (Core VIPP). Specifically, The Core VIPP maintains and enhances effective delivery systems for dissemination, implementation and evaluation of best practice programs and policies. This includes support for State Health Departments and their local partners as well as support for national

resources such as the Safe States Alliance. Through the program, NCIPC is able to implement the top 20 innovations described in this article, as well as others. The key to Core's success is that it supports evidence-based interventions at the state and local level in order to optimize available resources for violence and injury prevention.

6. Conclusion

Taken together, these innovations have reduced the burden of violence and injury and have influenced current practice and practitioners in the United States and worldwide. Though this list is limited to 20, there are many other programs, practices, and policies that deserve recognition but did not fully meet our criteria. Our hope is that in another 20 years, we can describe many more innovations with the level of impact of the ones described in this article.

While it is clear there is much more to be done in the field, this list gives a base from which future interventions will be built. These emerging issues will require innovative solutions, such as deaths from prescription overdose, and traumatic brain injury in returning veterans. Thus, it is our hope that when this list is compiled for NCIPC's 40th anniversary, we will see a wide array of new successes and more novel ways to meet the challenges of the 21st century. We hope you will be part of that effort.

Biographies

Howard Kress joined the National Center for Injury Prevention and Control in 2010 as a program evaluator for the Core State Injury Program. As Behavioral Scientist at the CDC he also conducts research into the role of alcohol in violence and injury. Prior to joining CDC, Howard conducted research into the cultural and evolutionary causes of the demographic transition in Ecuador and Bangladesh through grants from the National Science Foundation. Dr. Kress received his PhD in Medical Anthropology from the University of Connecticut in 2008. Why he does what he does: To improve the programs we have for preventing and reducing the burden of violence and injury.

Rita Noonan is the Associate Director for Program Development and Integration at CDC's Injury Center. Rita has spent 10 year in the Injury Center as a Behavioral Scientist. During her tenure, she has worked on a wide range of projects including sexual and teen dating violence prevention, reduction of older adult falls, prescription drug overdose, and residential fires, as well as program planning and evaluation, and translation research. Prior to joining CDC, Dr. Noonan worked as a sociology and women's studies professor at the University of Iowa. In this capacity she conducted research in Latin America on the global debt crisis, gender, social movements, and health outcomes. Dr. Noonan has been the recipient of several prestigious awards, including a Fulbright Scholarship and a MacArthur Fellowship. Dr. Noonan received her doctoral degree in sociology from Indiana University in 1998. Why she does what she does: So my parents can live falls free.

Kimberley Freire is a Behavioral Scientist and program evaluator in NCIPC's Division of Violence Prevention. She works on multiple projects related to the prevention of sexual, intimate partner and teen dating violence and leads a three-year study on adapting

evidence-based interventions within violence prevention, recently funded by the Robert Wood Johnson Foundation. She has worked as an evaluator for the past 15 years within academic, government and non-profit public health institutions. Kimberley received her Ph.D. in Health Behavior and Health Education at the University of North Carolina at Chapel Hill School of Public Health and her MPH from Boston University School of Public Health. Kimberley's favorite violence prevention resource is DVP's VetoViolence, which provides wide access to violence prevention training and resources via the web (www.vetoviolence.org).

Angela Marr, MPH, is the Team Leader for the National Center for Injury Prevention and Control (NCIPC) state injury and violence prevention programs. Ms. Marr provides direction and leadership to achieve the NCIPC mission to prevent injuries and violence, and reduce their consequences and leads a program to build effective delivery systems for dissemination, implementation and evaluation of best practice programs and policies through state health department infrastructure. Angela began her career in injury prevention at the state and local level. Prior to her work at CDC, Angela worked for both the Alabama and Oklahoma State Departments of Health. She has a background in surveillance and program implementation. Why she does what she does: Because I love to see science in action.

Acasia B. Olson joins the CDC as a prevention specialist under the Public Health Prevention Service (PHPS) Fellowship. As a PHPS Fellow, Acasia has had the unique opportunity to work with NCIPC on several cross-cutting projects related to the intersection of policy and evaluation. Prior to arriving at CDC, Acasia engaged in initiatives and research around health education and disease prevention, with a focus on HIV/AIDS. She is interested in exploring ways to translate research into sustainable policy and programs that will allow communities to address emerging and endemic health issues. Acasia earned her MPH at The George Washington University School of Public Health and Health Services and holds a BA from Spelman College. She is fueled by an insatiable desire to equip communities with the tools to make informed decisions towards safe and healthy living. Why she does what she does: My husband is a distance runner and I don't him to be injured by a distracted driver while doing his part to live an active and healthy lifestyle.

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Table 1

The Spectrum of Prevention (modified from Cohen & Swift, 1999).

Element		Definition
1.	Strengthening Individual Knowledge and Skills	Enhancing an individual's capability of preventing violence or injury and promoting safety
2.	Promoting Community Education	Reaching groups of people with information and resources to promote health and safety
3.	Educating Providers	Informing providers who will transmit skills and knowledge to others
4.	Fostering Coalitions and Network	Bringing together groups and individuals for broader goals and greater impact
5.	Changing Organizational Practices	Adopting regulations and shaping norms to improve health and safety
6.	Influencing Policy and Legislation	Developing strategies to change laws polices to influence outcomes
7.	Infrastructure	The program has access to sufficient data systems, demonstrates high organizational capacity, and has sufficient funding to implement interventions

Table 2

Top 20 Violence & Injury Practice Innovations since 1992 (not in order of importance).

	Innovations
1	Heads Up Initiatives
2	Field Triage and Advanced Automatic Crash Notification
3	Connecting Practitioners Online
4	Smoke Alarm Installation Program (SAIFE)
5	Urban Networks to Increase Thriving Youth (UNITY)
6	Moving Upstream: Shift to Primary Prevention of Sexual and Domestic Violence (RPE & DELTA)
7	Engaging Boys and Men to Prevent Rape and Violence
8	Universal School-based Violence Prevention Programs
9	Positive Parenting Program – Triple P
10	Business Improvement Districts (BIDs) to Reduce Violence
11	0.08 Blood Alcohol Concentration Laws
12	Sobriety checkpoints
13	Ignition interlocks
14	Occupant restraint (airbags, seatbelts)
15	Child Passenger Restraint Seats
16	Graduated Driver's Licensing
17	Bicycle Helmet Laws
18	Surveillance/Electronic Coding
19	WISQARS (Web-based Injury Statistics Query and Reporting System)
20	Injury Control Research Centers