musc Children's Health
Medical University of South Carolina

Gun Violence:
A Leading Cause of Preventable Death in Children

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Disclosures

- We have nothing to disclose

Objectives

- Recognize the impact of gun violence on children and their families in the US
- Appreciate racial inequities in gun violence
- Describe two evidence-based strategies to prevent gun violence among children in the US

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL REPORT

The Major Causes of Death in Children and Adolescents in the United States

Rebecca M. Cunningham, M.D., Maureen A. Walton, M.P.H., Ph.D., and Patrick M. Carter, M.D.

Table 1. The 10 Leading Causes of Child and Adolescent Death in the United States in 2016, in Order of Frequency.*

Cause of Death	No. of Deaths	Rate per 100,000 (95% CI)	Percent of Deaths
All causes	20,360	26.06 (25.70–26.42)	
All injury-related causes	12,336	15.79 (15.51–16.07)	60.6
Motor vehicle crash	4,074	5.21 (5.06–5.38)	20.0
Firearm-related injury	3,143	4.02 (3.88–4.16)	15.4
Homicide	1,865	2.39 (2.28–2.50)	
Suicide	1,102	1.41 (1.33–1.50)	
Unintentional	126	0.16 (0.13–0.19)	
Undetermined intent	50	0.06 (0.05–0.09)	
Malignant neoplasm	1,853	2.37 (2.27–2.48)	9.1
Suffocation†	1,430	1.83 (1.74–1.93)	7.0
Suicide	1,110	1.42 (1.34–1.51)	
Unintentional	235	0.30 (0.26–0.34)	
Drowning	995	1.27 (1.20–1.36)	4.9
Drug overdose or poisoning	982	1.26 (1.18–1.34)	4.8
Suicide	123	0.16 (0.13–0.19)	
Unintentional	761	0.97 (0.91–1.05)	
Congenital anomalies	979	1.25 (1.18–1.33)	4.8
Heart disease	599	0.77 (0.71–0.83)	2.9
Fire or burns	340	0.44 (0.39–0.48)	1.7
Unintentional	272	0.35 (0.31–0.39)	
Chronic lower respiratory disease	274	0.35 (0.31–0.40)	1.3

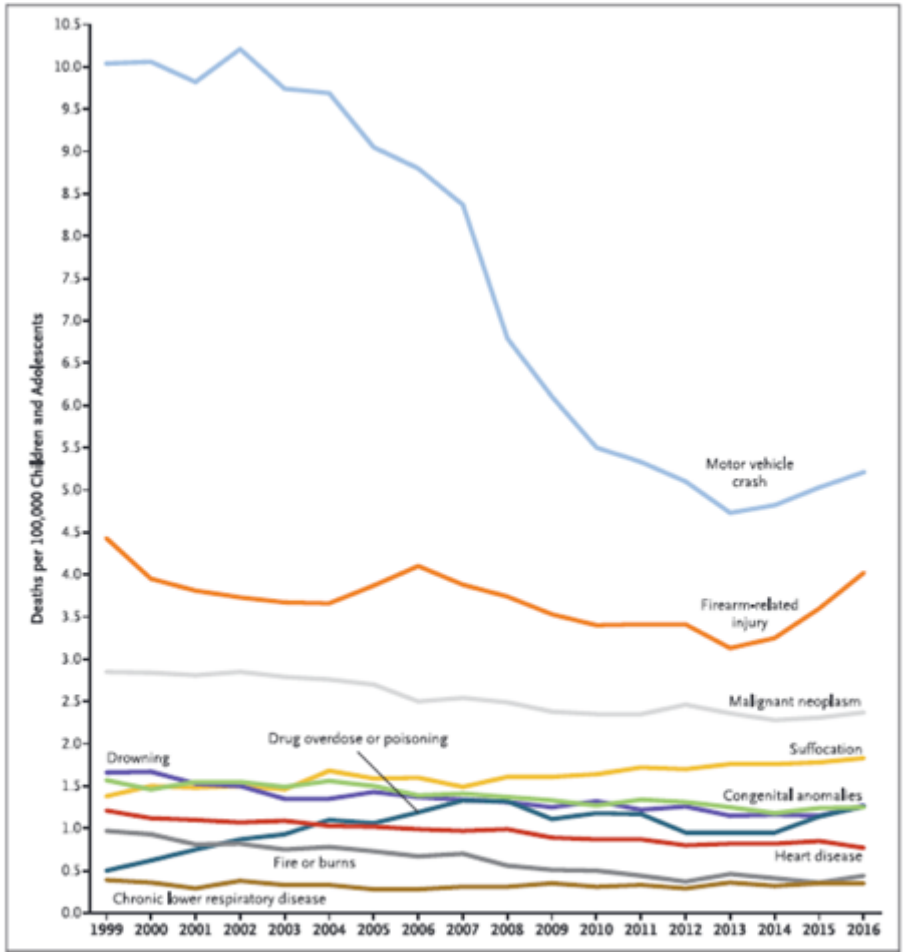


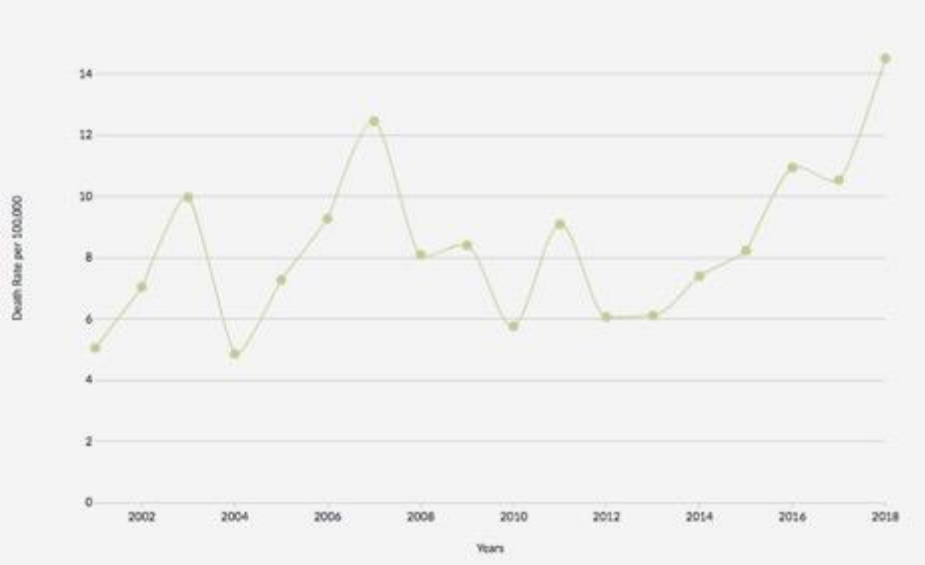
Figure 1. Mortality Rates (Deaths per 100,000 Children and Adolescents) for the 10 Leading Causes of Death in the United States from 1999 to 2016.

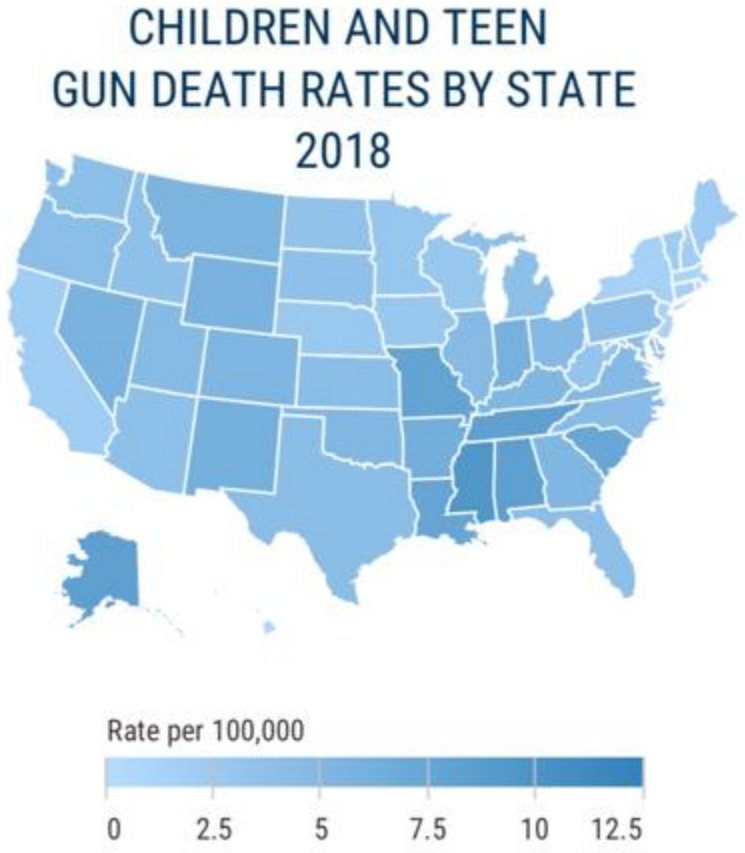
Data were obtained from the Wide-ranging Online Data for Epidemiologic Research (WONDER) system of the Centers for Disease Control and Prevention (CDC), known as CDC WONDER,[2] according to the codes of the *International Classification of Diseases, 10th Revision* (ICD-10),[3] for the leading causes of death among children and adolescents. Age was restricted to children and adolescents 1 to 19 years of age.

South Carolina & Firearm Mortality

- South Carolina ranks **6th highest** in pediatric firearm death rate (7.18 per 100,000 people)
- South Carolina ranks **4th highest** in pediatric homicide rate (74% committed with firearms)
- South Carolina rate ***increased*** in 2018, while it decreased overall in the U.S.

S.C. Firearm Homicide Rate Trend Ages 15-19





Educational Fund to Stop Gun Violence. (2020). Gun Violence in America: An Analysis of 2018 CDC Data. www.efsgv.org.

What About SC Laws?

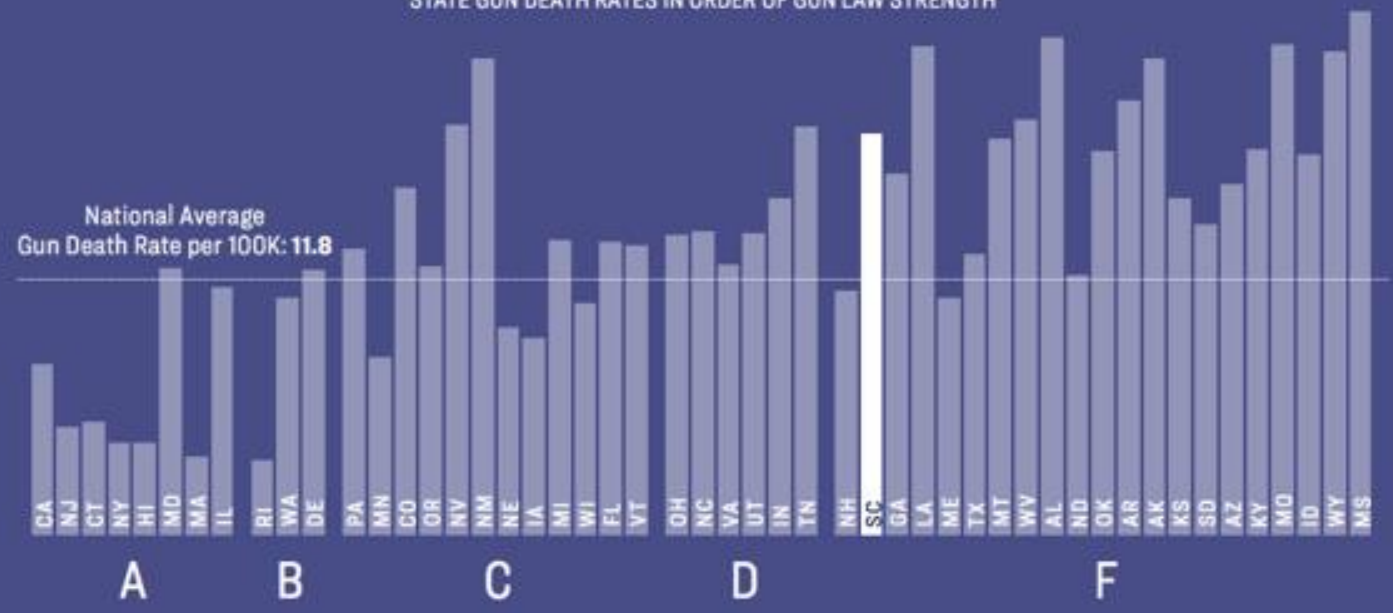
ANNUAL GUN LAW SCORECARD

Gun Law Strength: **31** OF 50 STATES

Gun Death Rank: **12** OF 50 STATES

Stronger Gun Laws, Fewer Gun Deaths

STATE GUN DEATH RATES IN ORDER OF GUN LAW STRENGTH



SOUTH CAROLINA'S GUN DEATH RATE PER 100K PEOPLE: **17.51**

South Carolina has very weak gun laws. The state has the 12th-highest gun death rate in the country and exports crime guns at the seventh-highest rate. To save lives from gun violence, South Carolina could fund community violence intervention programs and require a background check before every gun purchase.

https://giffords.org/lawcenter/resources/scorecard/

Firearm Injury Morbidity

- Profound burden– economic, social, and medical
- More likely to experience limiting disabilities, post-traumatic stress disorder, substance abuse, chronic health problems, and have lower educational attainment and employment compared to their peers.
- ***Toxic stress*****,** including exposure to violence as a child, can lead to potentially permanent changes in learning, behavior and physiology
  - Higher levels of stress related chronic diseases
  - Increased prevalence of unhealthy lifestyles that can widen health disparities
- They are also *more likely to die* from a subsequent firearm injury.
- Families and communities also suffer - emotionally, psychologically and financially.

Hurt H, Malmud E, Brodsky NL, Giannetta J. Exposure to Violence: Psychological and Academic Correlates in Child Witnesses. *Arch Pediatr Adolesc Med.* 2001;155(12):1351-1356

Fowler PJ, Tompsett CJ, Braciszewski JM, Jacques-Tiura AJ, Baltes BB. Community violence: a meta-analysis on the effect of exposure and mental health outcomes of children and adolescents. Dev Psychopathol. 2009;21(1):227.

Fahimi J, Larimer E, Hamud-Ahmed W, *et al* Long-term mortality of patients surviving firearm violence, *Injury Prevention* 2016;**22:**129-134.

Disparity v. Inequity

- Disparity simply means a difference
- Inequity means an unjust difference

Racial Inequities in Firearm Violence

- Black Americans are disproportionately impacted by gun violence.
  - 10 times the gun homicides
  - 15 times the gun assaults
  - 3 times the fatal police shootings of white Americans

- Black women are twice as likely to be fatally shot by an intimate partner compared to white women.

Petrosky E., et al. “Racial and Ethnic Differences in Homicides of Adult Women and the Role of Intimate Partner Violence — United States, 2003–2014”. *MMWR. Morbidity and Mortality Weekly Report.* (2017). https://bit.ly/304mN46

Racial Inequities in Pediatric Firearm Violence

- Firearm injuries are the **LEADING CAUSE OF DEATH FOR BLACK CHILDREN IN THE US**.
- Boys, older children and minorities are disproportionately affected by firearm violence
- **Black boys and youths (0-19) had the highest firearm homicide rate in 2018** compared to other racial and ethnic groups among both males and females
  - 14 times higher than their White (non-Latino) peers

Educational Fund to Stop Gun Violence. (2020). Gun Violence in America: An Analysis of 2018 CDC Data. www.efsgv.org.

Police Violence and Black Americans

- 95 percent of the deaths of civilians caused by police are with a firearm
- Black people are the victims at a disproportionate rate
- Black people in America are nearly 3 times as likely to be shot and killed by the police than white Americans

Buehler, J. W. “Racial/Ethnic Disparities in the Use of Lethal Force by US Police, 2010–2014”. American Journal of Public Health.

Prevention: Unintentional Shootings and Suicide

Firearm Access

- 13 million US children live in a household with a gun
- 4.6 million US children live in a household with at least one loaded, unlocked gun
- The majority of children in gun-owning households are aware of where their parents store their guns
- More than 1/3 reported handling their parents' guns
- 1/4 of these parents did not know that their children had handled the gun in their house

Azrael D, Cohen J, Salhi C, Miller M. Firearm Storage in Gun-Owning Households with Children: Results of a 2015 National Survey. *J Urban Health.* 2018;95(3):295-304.

Baxley F, Miller M. Parental misperceptions about children and firearms. *Archives of pediatrics & adolescent medicine.* 2006;160(5):542-547

The Risks of Firearm Access

- Nearly 90% of unintentional gun deaths and injuries in children occur in the home
- The firearm used in youth suicide comes from the home 9 out of 10 times
- In incidents of gunfire on school grounds, 78% of shooters under the age of 18 obtained the gun from their home or the home of a friend or relative

Li G, Baker SP, DiScala C, Fowler C, Ling J, Kelen GD. Factors associated with the intent of firearm-related injuries in pediatric trauma patients. *Archives of pediatrics & adolescent medicine.* 1996;150(11):1160-1165.

Grossman et al. Self-inflicted and Unintentional Firearm Injuries Among Children and Adolescents: The Source of the Firearm. JAMA Pediatrics. 1999

Everytown for Gun Safety, Gunfire on School Grounds Database. 2013-2018.

Prevention Strategies: Firearm Access

- Preschool aged children, observed 1 week after informational intervention where they were told not to play with guns (“just say no”)
  - No difference in gun-playing behavior
- 4-7 year old children went through a week-long skills based gun safety training program
  - Just as likely as children with no training to approach or play with a handgun
- 4-5 year old children in two different gun safety programs
  - Able to verbally repeat gun safety message
  - Could not demonstrate gun safety skills in real-life assessments

Hardy MS, Armstrong FD, Martin BL, Strawn KN. A firearm safety program for children: they just can't say no. *J Dev Behav Pediatr.* 1996;17(4):216-221.

Hardy MS. Teaching firearm safety to children: failure of a program. *J Dev Behav Pediatr.* 2002;23(2):71-76.

Himle MB, Miltenberger RG, Gatheridge BJ, Flessner CA. An evaluation of two procedures for training skills to prevent gun play in children. *Pediatrics.* 2004;113(1 Pt 1):70-77.

Prevention Strategies: Responsible Storage

- Responsible storage is storing a gun LOCKED, UNLOADED and SEPARATE from ammunition.
- Responsible storage is associated with decreased risk of firearm suicide and unintentional firearm injury among children
- Households with locked firearms and separate locked ammunition:
  - 78% lower risk of self-inflicted firearm injuries
  - 85% lower risk of unintentional firearm injuries

Grossman DC, Mueller BA, Riedy C, et al. Gun storage practices and risk of youth suicide and unintentional firearm injuries. *JAMA : the journal of the American Medical Association.* 2005;293(6):707-714.

Parikh K, Silver A, Patel SJ, Iqbal SF, Goyal M. Pediatric Firearm-Related Injuries in the United States. *Hosp Pediatr.* 2017;7(6):303-312.

How can Pediatricians Help?

- Brief physician counseling combined with distribution of a cable gun lock is effective in increasing safe storage of home firearms
- Educational interventions targeting adults and including distribution of cable gun locks are the most likely to be effective
- AAP recommends pediatricians routinely screen for access to firearms and counsel about risk reduction
- On ASK day, June 21, the first day of summer, the AAP reminds parents to ensure their kids are safe by asking about gun safety and storage

Barkin SL, Finch SA, Ip EH, et al. Is officebased counseling about media use, timeouts, and firearm storage effective? Results from a cluster-randomized, controlled trial. Pediatrics. 2008;122

Parikh K, Silver A, Patel SJ, Iqbal SF, Goyal M. Pediatric Firearm-Related Injuries in the United States. Hosp Pediatr. 2017;7(6):303-312.

Prevention Strategies: Physician Counseling

- The majority of health care providers agree they should provide firearm counseling, but they report many barriers:
  - lack of time
  - inadequate training
  - uncertainty of the effect
- A recent study demonstrated poor pediatric resident documentation of screening for firearm access in patients with suicidal ideation or homicidal ideation
- Another recent study demonstrated low rates of firearm screening and safe storage counseling by pediatric residents in the inpatient setting

Webster DW et al. Firearm injury prevention counseling; a study of pediatricians' beliefs and practices. Pediatrics. 1992

Naureckas Li C et al. Screnning for access to firearms by pediatric trainees in high-risck patients. Academic Pediatrics. 2019.

Monroe KK et al. Firearms screening in the pediatric inpatient setting. Hospital Pediatrics. 2020.

Prevention Strategies: Physician Counseling

- A 2019 study showed that when prompts for firearm screening and smoke alarms were added to the Electronic Health Record (EHR), pediatricians and residents were significantly less likely to document firearm screening than smoke alarm counseling

- A 2020 study assessed the impact of a firearm safety counseling workshop on pediatric resident knowledge, self-efficacy and self-reported practice patterns
  - In pre-post analysis they found participants were 5x more likely to counsel their patients on firearms (6 months post compared to pre)
  - Reported greater comfort in asking about firearms

Stipelman CH et al. Home gun safety queries in well-child visists. JAMA Pediatrics. 2019.

McKay S et al. Addressing Firearm Safety Counseling: Integration of a Multidisciplinary Workshop in a Pediatric Residency Program. Journal of GME. 2020

BE SMART

SECURE all guns in your homes and vehicles

MODEL responsible behavior

ASK about unsecured guns in other homes

RECOGNIZE the role of guns in suicide

TELL your peers to Be SMART

The Post and Courier
FOUNDED 1803 WINNER OF THE PULITZER PRIZE

MUSC doctors will ask questions about guns in the home with new safety campaign

BY MARY KATHERINE WILDEMAN MKWILDEMAN@POSTANDCOURIER.COM
JUL 2, 2018

MUSC physician Annie Andrews started an effort to encourage fellow pediatricians to open more conversations about gun safety with their patients' parents. Wade Spees/Staff

WADE SPEES

Improving the Frequency and Documentation of Gun Safety Counseling in a Resident Primary Care Clinic

Kelsey A.B. Gastineau, MD; Cassandra L. Stegall, DO; Laura K. Lowrey, MD; Barbra K. Giourgas, MD; Annie Lintzenich Andrews, MD, MSCR

Date	Intervention
Jan-May 2018	Baseline time period
May 2018	Be SMART lecture
June 2018	Resident initial survey
June 2018	Parent Safety Survey Resident follow-up survey Wear Orange Day
July 2018	Be SMART roll-out in PPC clinic
March 2019	EHR prompt added
June 2019	Wear Orange Day
July 2019	New intern class
October 2019	Email reminder prompt to residents
Weekly	Informal in-person reminders

1. Is there a gun in the home or vehicles? Yes/No
2. Is the gun stored locked, unloaded and separate from ammunition? Yes/No
3. Was a gunlock or other additional gun safety information such as Be SMART materials provided? Yes/No?
    a. If yes, what additional materials were provided:

Figure 3. *EHR prompt for firearm safety screening questions. EHR indicates Electronic Health Record.*

Gastineau KAB et al. Improving the Frequency and Documentation of Gun Safety Counseling in a Resident Primary Care Clinic. Academic Pedatrics. Epub 2020

Improving the Frequency and Documentation of Gun Safety Counseling in a Resident Primary Care Clinic

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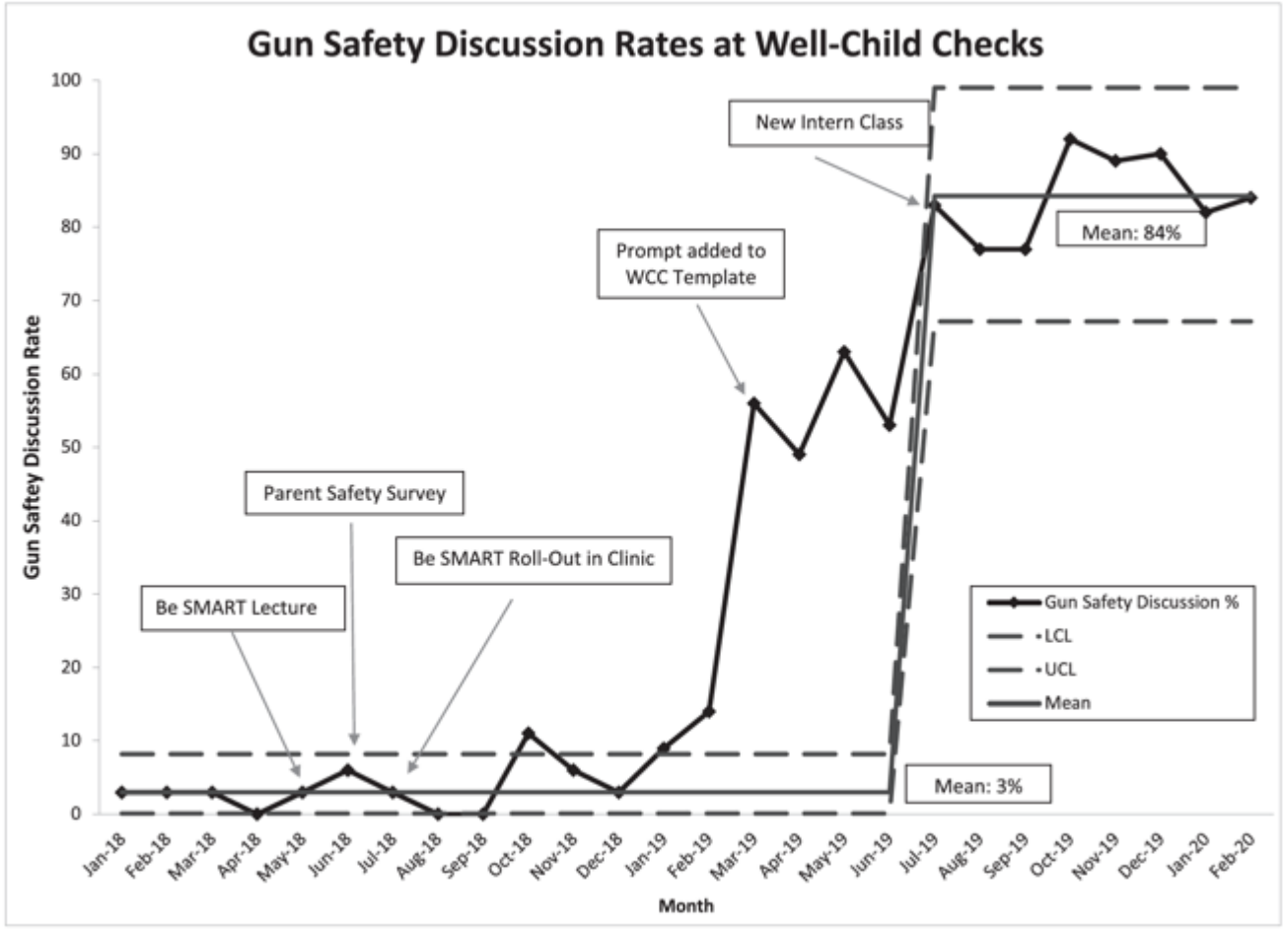

Figure 4. *Statistical process control chart. LCL indicates lower confidence limit; UCL, upper confidence limit; and WCC, well-child check.*

Prevention: Community Violence

Prevention Strategies: Homicide and Community Violence

Hospital Based Violence Intervention Programs

- Identify youth with violent injuries or with risks of injury
- Risk assessment… what can help this person ***never experience this again?***
- Identify needs, resources, and create action plan
  - Hospital & community
  - Intensive follow-up
- Family and community support

https://vimeo.com/139321826

Noteworthy Program – *WrapAround project*, San Francisco

- Hospital case management, community resources
- Participants:
  - Ages 10-30 “high-risk” patients identified by social workers
- Outcomes
  - Recidivism for violent injury
- Budget $320k annually

- N=254, recidivism significantly lower compared to historical controls (16% vs. 4.5%)
- Services most associated with success:
  - Mental health support
  - Employment
- $4 saved for every $1 spent in health care alone

Smith R et al. J of Trauma, 2013

What Does This Look Like for a Client?

16 yo male laceration to the arm after punching a window

Parents recently separated
Physical punishment in home
Fights at school
Marijuana use
Dropping grades
Firearm in home
Symptoms of PTSD
Other social determinants of trauma…

Weekly contact
Follow-up with program coordinators, school counselor, social worker
Family meetings monthly
Psychological counseling

Referral

Who | **Situation** | **Assessment** | **Plan** | **Follow-up**

Tearful, poor eye contact
Locked in room for punishment

Psychology (TRRP)
CPS referral
School counselor
Peer mentor
Parks & Rec Arts program
Lethal means access counseling
Summer internship

Hospital Based Violence Intervention Programs:
Successful and Cost Effective

- Systematic review of trauma center-based youth violence programs (Ages 10-24)
  - 90% demonstrated improved outcomes
  - >50% showed lower recidivism
- Individual, intensive community-based case management are most successful

Hospital-centered violence intervention programs: a cost-effectiveness analysis

Vincent E. Chong, M.D., M.S.[a], Randi Smith, M.D., M.P.H.[a], Arturo Garcia, M.D.[a], Wayne S. Lee, M.D.[a], Linnea Ashley, M.P.H.[b], Anne Marks, M.P.P.[b], Terrence H. Liu, M.D., M.P.H.[a], Gregory P. Victorino, M.D.[a,*]

[a]*Department of Surgery, Highland Hospital, University of California, San Francisco–East Bay, 1411 East 31st Street, QIC 22134,* [b]*Youth ALIVE!, 3300 Elm Street, Oakland, CA, USA*

AAST 2014 Plenary Paper

Saving lives and saving money: Hospital-based violence intervention is cost-effective

Catherine Juillard, MD, MPH, Randi Smith, MD, MPH, Nancy Anaya, MD, MS, Arturo Garcia, MD, James G. Kahn, MD, MPH, *and* Rochelle A. Dicker, MD, *San Francisco, California*

Current Opinion

Hospital-based violence intervention programs save lives and money

Jonathan Purtle, MPH, MSC, Rochelle Dicker, MD, Carnell Cooper, MD, Theodore Corbin, MD, MPP, Michael B. Greene, PhD, Anne Marks, MPP, Diana Creaser, MS, RN, Deric Topp, MPH, *and* Dawn Moreland, RN, BSN

Mikhail JN, J Trauma, Violence & Abuse, 2015.

Hospital Based Violence Intervention Programs:
Supported by 44 Medical & Public Health Organizations

SPECIAL ARTICLE

Proceedings from the Medical Summit on Firearm Injury Prevention: A Public Health Approach to Reduce Death and Disability in the US

Check for updates

Eileen M Bulger, MD, FACS, Deborah A Kuhls, MD, FACS, Brendan T Campbell, MD, FACS, Stephanie Bonne, MD, FACS, Rebecca M Cunningham, MD, FACEP, Marian Betz, MD, FACEP, Rochelle Dicker, MD, FACS, Megan L Ranney, MD, MPH, FACEP, Chris Barsotti, MD, FACEP, Stephen Hargarten, MD, MPH, Joseph V Sakran, MD, MPH, FACS, Frederick P Rivara, MD, MPH, FAAP, Thea James, MD, FACEP, Dorian Lamis, PhD, Gary Timmerman, MD, FACS, Selwyn O Rogers, MD, FACS, Bechara Choucair, MD, Ronald M Stewart, MD, FACS

Bulger et al. J ACS. 2019