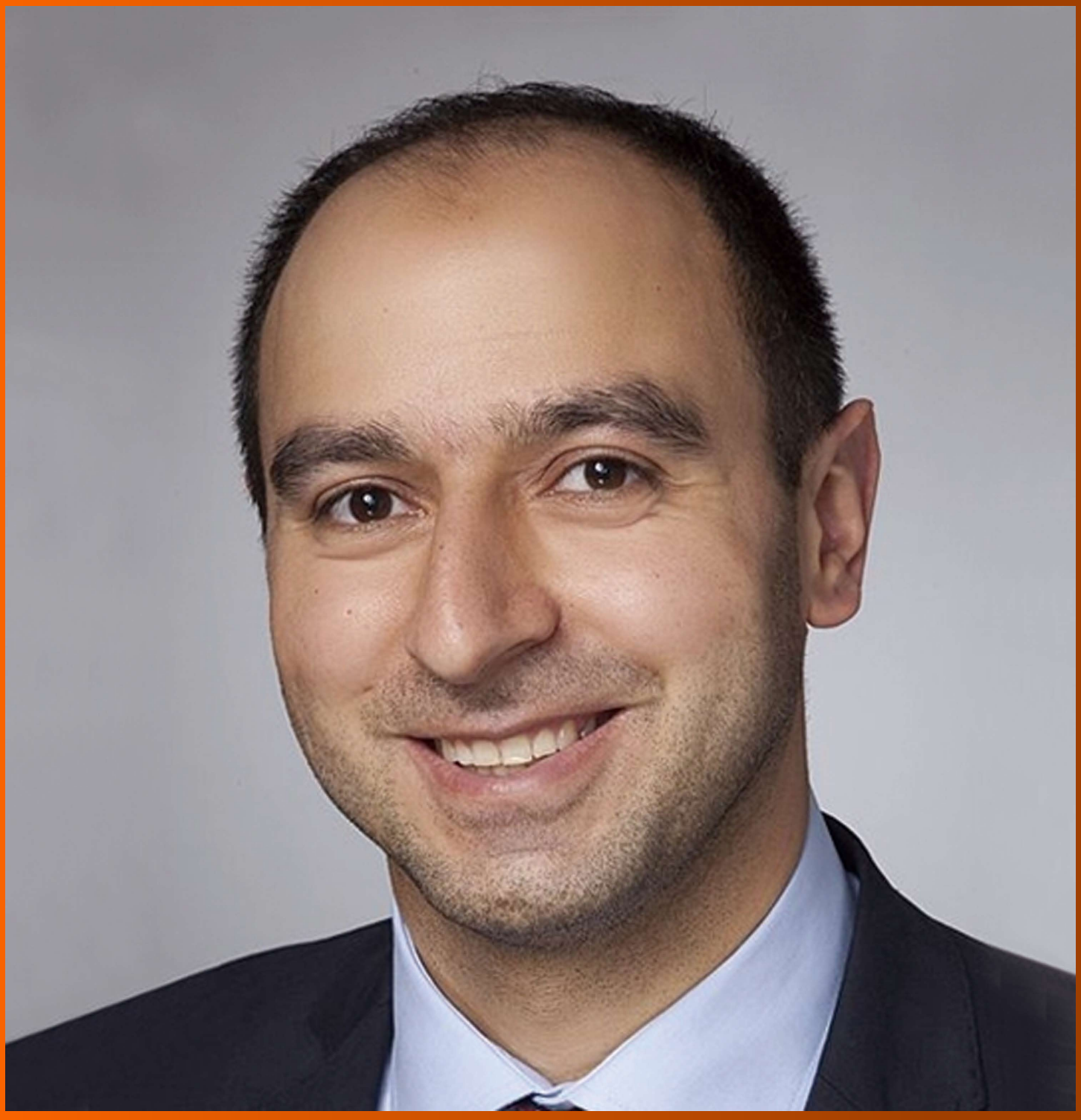
ISSN 1949-8462 (online)

World Journal of *Cardiology*

World J Cardiol 2018 July 26; 10(7): 49-61



Published by Baishideng Publishing Group Inc

World Journal of Cardiology

Contents

Monthly Volume 10 Number 7 July 26, 2018

ABOUT COVER

Editorial Board Member of *World Journal of Cardiology*, Ibrahim Akin, FACC, MD, Professor, First Department of Medicine, University Medical Center Mannheim, University of Heidelberg, Heidelberg 69115, Germany

AIM AND SCOPE

World Journal of Cardiology (*World J Cardiol*, *WJC*, online ISSN 1949-8462, DOI: 10.4330) is a peer-reviewed open access journal that aims to guide clinical practice and improve diagnostic and therapeutic skills of clinicians.

WJC covers topics concerning arrhythmia, heart failure, vascular disease, stroke, hypertension, prevention and epidemiology, dyslipidemia and metabolic disorders, cardiac imaging, pediatrics, nursing, and health promotion. Priority publication will be given to articles concerning diagnosis and treatment of cardiology diseases. The following aspects are covered: Clinical diagnosis, laboratory diagnosis, differential diagnosis, imaging tests, pathological diagnosis, molecular biological diagnosis, immunological diagnosis, genetic diagnosis, functional diagnostics, and physical diagnosis; and comprehensive therapy, drug therapy, surgical therapy, interventional treatment, minimally invasive therapy, and robot-assisted therapy.

We encourage authors to submit their manuscripts to *WJC*. We will give priority to manuscripts that are supported by major national and international foundations and those that are of great basic and clinical significance.

INDEXING/ABSTRACTING

World Journal of Cardiology is now indexed in Emerging Sources Citation Index (Web of Science), PubMed, and PubMed Central.

NAME OF JOURNAL
World Journal of Cardiology

ISSN
ISSN 1949-8462 (online)

LAUNCH DATE
December 31, 2009

FREQUENCY
Monthly

EDITORIAL BOARD MEMBERS
All editorial board members resources online at http://www.wjgnet.com/1949-8462/editorialboard.htm

EDITORIAL OFFICE
Jin-Lei Wang, Director
World Journal of Cardiology
Baishideng Publishing Group Inc
7901 Stoneridge Drive, Suite 501, Pleasanton, CA 94588, USA
Telephone: +1-925-2238242
Fax: +1-925-2238243
E-mail: editorialoffice@wjgnet.com
Help Desk: http://www.f6publishing.com/helpdesk
http://www.wjgnet.com

PUBLISHER
Baishideng Publishing Group Inc
7901 Stoneridge Drive, Suite 501,
Pleasanton, CA 94588, USA
Telephone: +1-925-2238242
Fax: +1-925-2238243
E-mail: bpgoffice@wjgnet.com
Help Desk: http://www.f6publishing.com/helpdesk
http://www.wjgnet.com

PUBLICATION DATE
July 26, 2018

INSTRUCTIONS TO AUTHORS
http://www.wjgnet.com/bpg/gerinfo/204

ONLINE SUBMISSION
http://www.f6publishing.com

World Journal of Cardiology

Submit a Manuscript: http://www.f6publishing.com

World J Cardiol 2018 July 26; 10(7): 49-51

DOI: 10.4330/wjc.v10.i7.49

ISSN 1949-8462 (online)

EDITORIAL

Preventing pediatric cardiothoracic trauma: Role of policy and legislation

Konstantinos S Mylonas, Pouya Hemmati, Diamantis I Tsilimigras, Pavlos Texakalidis, Konstantinos P Economopoulos

Konstantinos S Mylonas, Pediatric Cardiology Working Group, Society of Junior Doctors, Athens 15123, Greece

Pouya Hemmati, Department of Surgery, Mayo Clinic, Rochester, MN 55902, United States

Diamantis I Tsilimigras, School of Medicine, National and Kapodistrian University of Athens, Athens 11527, Greece

Diamantis I Tsilimigras, Pavlos Texakalidis, Konstantinos P Economopoulos, Surgery Working Group, Society of Junior Doctors, Athens 15123, Greece

Pavlos Texakalidis, School of Medicine, Faculty of Health Sciences, Aristotle University of Thessaloniki, Thessaloniki 54621, Greece

Konstantinos P Economopoulos, Department of Surgery, Duke University Medical Center, Durham, NC 27710, United States

ORCID number: Konstantinos S Mylonas (0000-0002-2356-6694); Pouya Hemmati (0000-0002-6248-3744); Diamantis I Tsilimigras (0000-0002-3676-9263); Pavlos Texakalidis (0000-0002-8715-6651); Konstantinos P Economopoulos (0000-0003-4856-0405).

Author contributions: Mylonas KS, Hemmati P, Tsilimigras DI, Texakalidis P and Economopoulos KP designed the study; Mylonas KS, Tsilimigras DI and Texakalidis P collected the data; Mylonas KS drafted the manuscript; Mylonas KS, Hemmati P, Tsilimigras DI, Texakalidis P and Economopoulos KP critically revised the manuscript; Economopoulos KP supervised this study.

Conflict-of-interest statement: The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Manuscript source: Invited Manuscript

Correspondence to: Konstantinos S Mylonas, MD, Postdoctoral Fellow, Pediatric Cardiology Working Group, Society of Junior Doctors, Menalou 5, Athens 15123, Greece. ksmylonas@gmail.com
Telephone: +30-69-76948121

Received: May 12, 2018
Peer-review started: May 12, 2018
First decision: June 6, 2018
Revised: June 11, 2018
Accepted: June 27, 2018
Article in press: June 27, 2018
Published online: July 26, 2018

Abstract

Data from the last 50 years suggest that pediatric patients typically suffer cardiothoracic injuries following blunt traumatic force (70%) in the setting of either motor vehicle crashes (53.5%) or vehicle-pedestrian accidents (18.2%). Penetrating trauma accounts for 30% of pediatric cardiothoracic injuries, half of which are gunshot wounds. Graduated driver licensing programs, gun-control legislation, off-road vehicle regulation, initiatives such as "Prevent the Bleed", as well as professional society recommendations are key in preventing pediatric cardiothoracic injuries.

Key words: Pediatric trauma; Blunt cardiac trauma; Penetrating cardiac trauma; Injury; Children; Policy; Legislation

Core tip: Graduated driver licensing programs, gun-control legislation, off-road vehicle regulation, initiatives such as "Prevent the Bleed", as well as professional society recommendations are key in preventing pediatric cardiothoracic injuries.

Mylonas KS, Hemmati P, Tsilimigras DI, Texakalidis P, Economopoulos KP. Preventing pediatric cardiothoracic trauma: Role of policy and legislation. *World J Cardiol* 2018; 10(7): 49-51 Available from: URL: http://www.wjgnet.com/1949-8462/full/v10/i7/49.htm DOI: http://dx.doi.org/10.4330/wjc.v10.i7.49

INTRODUCTION

Trauma is a leading cause of pediatric mortality in the developed world and can have substantial physical and psychological sequalae in surviving victims[1]. Cardiothoracic injury is the second most commonly reported trauma-associated cause of fatality after head trauma[2,3]. Although isolated cardiothoracic injury is typically non-lethal, mortality rates can be as high as 20%-40% in multi-system trauma patients[4]. Our group recently analyzed epidemiological and outcomes data on a total of 1062 pediatric cardiac trauma patients that were treated at United States centers in the last 50 years[5]. In this editorial, we explore various policy interventions directed at reducing the incidence, morbidity, and mortality of cardiothoracic trauma in children.

Pediatric patients typically suffer cardiothoracic injuries following blunt traumatic force (70%) in the setting of either motor vehicle crashes (MVCs) (53.5%) or vehicle-pedestrian accidents (18.2%)[5,6]. A National Trauma Data Bank analysis revealed that teenagers are at a higher risk of suffering blunt cardiothoracic injury[7], at least partly due to sociobehavioral factors. In several states, teenagers can get a learner's permit before age 16 and a driver's license by age 16. Also, a number of risk factors predisposing to MVCs, such as reckless driving, cell phone use while driving, and driving while intoxicated (DWI) are frequently seen amongst adolescents[8-10].

Therefore, preventing MVCs is essential in diminishing pediatric cardiothoracic trauma rates. Graduated driver licensing (GDL) has been legislated in an effort to reduce MVC rates and is predicated on the concept of slowly and safely exposing young drivers to higher-risk driving conditions[11,12]. Traditionally GDL programs begin with restricted to supervised driving, followed by unsupervised driving under settings that involve intermediate risk, and ultimately lead to full licensure[12]. According to data from the Fatality Analysis Reporting System, National Automotive Sampling System General Estimates System, Census Bureau, and National Household Travel Surveys, per capita fatal and police-reported MVC rates in 2012 were higher for middle-aged drivers than for adolescent over 16 years old. Fatal DWIs also decreased for teenagers after introducing GDL programs[13]. In addition, implementing school-based pedestrian safety intervention programs has been shown to reduce the incidence of pediatric pedestrian collisions[14,15].

Off-road vehicles (ORVs) have also been associated with pediatric cardiothoracic trauma among various other types of injury[16-18]. The Eastern Association for the Surgery of Trauma supports the enactment and implementation of legislature as a way of reducing ORV-related injuries[17]. A landmark act regulating the use of ORVs was "Sean's Law" which amended Massachusetts General Laws Chapter 90b (Sections 21-35). After the enforcement of "Sean's Law", the rate of emergency department discharges in Massachusetts declined by over 30% in children under the age of 10, 50% in 10- to 13-year-old, and nearly 40% in 14- to 17-year-old[16].

Our recent analysis also suggests that penetrating trauma accounts for 30% of pediatric cardiothoracic injuries, half of which are gunshot wounds (GSWs)[5]. Of note, in recent years, GSW-related mortality rates in United States adolescents exceeded deaths from MVCs[19]. In an attempt to reduce firearm injuries in children, both the American Academy of Pediatrics (AAP) and the American Pediatric Surgical Association support firearm-control legislation[20,21]. The AAP also endorses all efforts to identify adolescents at high risk for becoming GSW victims, including those with a history of family or peer violence, substance abuse, depression, previous suicide attempts, or carrying of weapons[20]. Child health care professionals are encouraged to engage in discussions with parents regarding making a gun-safe environment at home by either implementing safe storage techniques (ammunition and firearm stored separately and locked) or by removing firearms from the family's house altogether[20,22]. Similarly, the American College of Surgeons (ACS) Committee on Trauma advocates towards firearm safety features such as proof locks and "smart gun" technology[23].

CONCLUSION

Data from the last 50 years suggest that, in the United States, the vast majority of pediatric cardiothoracic injuries occur due to MVCs and GSWs[5]. Although public education programs such as the ACS's "Stop the Bleed" (teaching bystanders how to respond to life-threatening arterial hemorrhage) will save lives after traumatic wounds, we feel that advocating for methods that would prevent these injuries in the first place is equally, if not more, important[24]. Gun-control and ORV legislation, GDL programs, initiatives such as "Prevent the Bleed", as well as professional society recommendations are applicable in pediatric cardiothoracic trauma and can prevent these injuries[25].

REFERENCES

1 **Guice KS**, Cassidy LD, Oldham KT. Traumatic injury and children: a national assessment. *J Trauma* 2007; **63**: S68-S80; discussion S81-86 [PMID: 18091214 DOI: 10.1097/TA.0b013e31815acbb6]

2 **Gross BW**, Edavettal MM, Cook AD, Rinehart CD, Lynch CA, Bradburn EH, Wu D, Rogers FB. Big children or little adults? A statewide analysis of adolescent isolated severe traumatic brain injury outcomes at pediatric versus adult trauma centers. *J Trauma Acute Care Surg* 2017; **82**: 368-373 [PMID: 27805998 DOI: 10.1097/TA.0000000000001291]

3 **Cooper A**, Barlow B, DiScala C, String D. Mortality and truncal injury: the pediatric perspective. *J Pediatr Surg* 1994; **29**: 33-38 [PMID: 8120758 DOI: 10.1016/0022-3468(94)90518-5]

4 **Hannan EL**, Farrell LS, Meaker PS, Cooper A. Predicting inpatient mortality for pediatric trauma patients with blunt injuries: a better alternative. *J Pediatr Surg* 2000; **35**: 155-159 [PMID: 10693657 DOI: 10.1016/S0022-3468(00)90001-0]

5 **Mylonas KS**, Tsilimigras DI, Texakalidis P, Hemmati P, Schizas D, Economopoulos KP. Pediatric Cardiac Trauma in the United States: A Systematic Review. *World J Pediatr Congenit Heart Surg* 2018; **9**: 214-223 [PMID: 29544413 DOI: 10.1177/2150135117747488]

6 **Pearson EG**, Fitzgerald CA, Santore MT. Pediatric thoracic trauma: Current trends. *Semin Pediatr Surg* 2017; **26**: 36-42 [PMID: 28302283 DOI: 10.1053/j.sempedsurg.2017.01.007]

7 **Kaptein YE**, Talving P, Konstantinidis A, Lam L, Inaba K, Plurad D, Demetriades D. Epidemiology of pediatric cardiac injuries: a National Trauma Data Bank analysis. *J Pediatr Surg* 2011; **46**: 1564-1571 [PMID: 21843725 DOI: 10.1016/j.jpedsurg.2011.02.041]

8 **Scott-Parker B**, Oviedo-Trespalacios O. Young driver risky behaviour and predictors of crash risk in Australia, New Zealand and Colombia: Same but different? *Accid Anal Prev* 2017; **99**: 30-38 [PMID: 27865138 DOI: 10.1016/j.aap.2016.11.001]

9 **Scott-Parker B**, Watson B, King MJ, Hyde MK. "I drove after drinking alcohol" and other risky driving behaviours reported by young novice drivers. *Accid Anal Prev* 2014; **70**: 65-73 [PMID: 24698806 DOI: 10.1016/j.aap.2014.03.002]

10 **Atchley P**, Strayer DL. Small Screen Use and Driving Safety. *Pediatrics* 2017; **140**: S107-S111 [PMID: 29093043 DOI: 10.1542/peds.2016-1758M]

11 **DePesa C**, Raybould T, Hurwitz S, Lee J, Gervasini A, Velmahos GC, Masiakos PT, Kaafarani HMA. The impact of the 2007 graduated driver licensing law in Massachusetts on the rate of citations and licensing in teenage drivers. *J Safety Res* 2017; **61**: 199-204 [PMID: 28454865 DOI: 10.1016/j.jsr.2017.02.012]

12 **Russell KF**, Vandermeer B, Hartling L. Graduated driver licensing for reducing motor vehicle crashes among young drivers. *Cochrane Database Syst Rev* 2011; CD003300 [PMID: 21975738 DOI: 10.1002/14651858.CD003300.pub3]

13 **McCartt AT**, Teoh ER. Tracking progress in teenage driver crash risk in the United States since the advent of graduated driver licensing programs. *J Safety Res* 2015; **53**: 1-9 [PMID: 25933991 DOI: 10.1016/j.jsr.2015.01.001]

14 **Nauta J**, van Mechelen W, Otten RH, Verhagen EA. A systematic review on the effectiveness of school and community-based injury prevention programmes on risk behaviour and injury risk in 8-12 year old children. *J Sci Med Sport* 2014; **17**: 165-172 [PMID: 23962868 DOI: 10.1016/j.jsams.2013.07.011]

15 **Hotz G**, de Marcilla AG, Lutfi K, Kennedy A, Castellon P, Duncan R. The WalkSafe Program: developing and evaluating the educational component. *J Trauma* 2009; **66**: S3-S9 [PMID: 19276724 DOI: 10.1097/TA.0b013e3181937f62]

16 **Flaherty MR**, Raybould T, Kelleher CM, Seethala R, Lee J, Kaafarani HMA, Masiakos PT. Age Legislation and Off-Road Vehicle Injuries in Children. *Pediatrics* 2017; **140**: pii: e20171164 [PMID: 28893850 DOI: 10.1542/peds.2017-1164]

17 **Rattan R**, Joseph DK, Dente CJ, Klein EN, Kimbrough MK, Nguyen J, Simmons JD, O'Keeffe T, Crandall M. Prevention of all-terrain vehicle injuries: A systematic review from The Eastern Association for the Surgery of Trauma. *J Trauma Acute Care Surg* 2018; **84**: 1017-1026 [PMID: 29389840 DOI: 10.1097/TA.0000000000001828]

18 **Akinpelu BJ**, Zuckerman SL, Gannon SR, Westrick A, Shannon C, Naftel RP. Pediatric isolated thoracic and/or lumbar transverse and spinous process fractures. *J Neurosurg Pediatr* 2016; **17**: 639-644 [PMID: 26894517 DOI: 10.3171/2015.10.PEDS15377]

19 **Fowler KA**, Dahlberg LL, Haileyesus T, Annest JL. Firearm injuries in the United States. *Prev Med* 2015; **79**: 5-14 [PMID: 26116133 DOI: 10.1016/j.ypmed.2015.06.002]

20 **Olson LM**, Christoffel KK, O'Connor KG. Pediatricians' involvement in gun injury prevention. *Inj Prev* 2007; **13**: 99-104 [PMID: 17446249 DOI: 10.1136/ip.2006.012401]

21 **Nance ML**, Krummel TM, Oldham KT; Trauma Committee of American Pediatric Surgical Association. Firearm injuries and children: a policy statement of the American Pediatric Surgical Association. *J Am Coll Surg* 2013; **217**: 940-946 [PMID: 24045138 DOI: 10.1016/j.jamcollsurg.2013.07.381]

22 **Firearm-related injuries affecting the pediatric population**. Committee on Injury and Poison Prevention. American Academy of Pediatrics. *Pediatrics* 2000; **105**: 888-895 [PMID: 10742344 DOI: 10.1542/peds.105.4.888]

23 **Kuhls DA**, Campbell BT, Burke PA, Allee L, Hink A, Letton RW, Masiakos PT, Coburn M, Alvi M, Lerer TJ, Gaines BA, Nance ML, Schuerer DJE, Palmieri TL, Davis JW, Geehan DM, Elsey JK, Sutton BH, McAndrew MP, Gross RI, Reed DN Jr, Van Boerum DH, Esposito TJ, Albrecht RM, Sarani B, Shapiro DS, Wiggins-Dohlvik K, Stewart RM; American College of Surgeons Committee on Trauma. Survey of American College of Surgeons Committee on trauma members on firearm injury: Consensus and opportunities. *J Trauma Acute Care Surg* 2017; **82**: 877-886 [PMID: 28240673 DOI: 10.1097/TA.0000000000001405]

24 **Masiakos PT**, Warshaw AL. Stopping the Bleeding Is Not Enough. *Ann Surg* 2017; **265**: 37-38 [PMID: 27611613 DOI: 10.1097/SLA.0000000000001969]

25 **Maa J**, Masiakos PT, Elsey JK, Warshaw AL. Prevent the Bleed: How Surgeons Can Lead the National Conversation About Firearm Safety Forward. *Ann Surg* 2018; **267**: 428-429 [PMID: 29252222 DOI: 10.1097/sla.0000000000002638]

P- Reviewer: Lin JA, Rigatelli G, Xavier-Elsas P **S- Editor**: Cui LJ
L- Editor: A **E- Editor**: Tan WW

Published by **Baishideng Publishing Group Inc**
7901 Stoneridge Drive, Suite 501, Pleasanton, CA 94588, USA
Telephone: +1-925-223-8242
Fax: +1-925-223-8243
E-mail: bpgoffice@wjgnet.com
Help Desk: http://www.f6publishing.com/helpdesk
http://www.wjgnet.com