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A Consensus-Driven Agenda for Emergency Medicine Firearm Injury Prevention Research

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Abstract

Objective—To identify critical Emergency Medicine (EM)-focused firearm injury research questions and to develop an evidence-based research agenda.

Methods—National content experts were recruited to a technical advisory group for the American College of Emergency Physicians Research Committee. Nominal Group Technique (NGT) was used to identify research questions by consensus. The technical advisory group decided to focus on five widely accepted categorizations of firearm injury. Subgroups conducted literature reviews on each topic and developed preliminary lists of EM-relevant research questions. In-person meetings and conference calls were held to iteratively refine the extensive list of research questions, following NGT guidelines. Feedback from external stakeholders was reviewed and integrated.

Results—Fifty-nine final EM-relevant research questions were identified, including questions that cut across all firearm injury topics and questions specific to self-directed violence (suicide and attempted suicide); intimate partner violence; peer (non-partner) violence; mass violence; and unintentional ("accidental") injury. Some questions could be addressed through research conducted in emergency departments (EDs); others would require work in other settings.

Conclusions—The technical advisory group identified key EM-relevant firearm injury research questions. EM-specific data is limited for most of these questions. Funders and researchers should consider increasing their attention to firearm injury prevention and control, particularly to the questions identified here and in other recently developed research agendas.

INTRODUCTION

Background

In the United States, firearms caused 114,633 injuries in 2014 alone. Of these, 81,034 were nonfatal.[1] The remainder were fatal injuries: 10,945 homicides (70% of all homicides), 21,334 suicides (50% of all suicide deaths), and the remainder due to unintentional, undetermined, or legal intervention.[2] Firearms are the second leading cause of death among U.S. youth (14–24), the primary cause of death among African-American youth,[3] and the most common method of suicide deaths.[4]

Nonfatal firearm-related injuries have long-term consequences. They increase risk of future violent victimization and death, crime perpetration, and subsequent firearm violence; they are also associated with high rates of physical disability and mental illness, both among victims and bystanders.[5–9] The costs associated with firearm violence, injury, and death are substantial: an estimated $630 million per year is spent on acute medical care alone, and significantly more on lost wages, long-term care, and legal proceedings.[10]

Relative to the burden of disease, there has been far too little high-quality firearm injury prevention and control research. In 2013, the Obama administration directed federal agencies to identify barriers to this research.[11] Despite specific recommendations from the Institute of Medicine and the National Research Council, research to reduce the burden of firearm-related injury and death is still lacking; as of the time of writing, no funds have been appropriated to the U.S. Centers for Disease Control and Prevention for research on firearm injury prevention and control.[12–17]

Importance

The initial evaluation and treatment of firearm injuries occurs routinely in the emergency department (ED).[18] Despite the significant health effects of firearm injuries, emergency medicine's (EM) well-established responsibility to care for patients suffering from these injuries, EM's history of leadership in injury prevention research, and ACEP's explicit endorsement of firearm injury prevention,[19, 20] only limited rigorous, EM-focused firearm injury research exists.

In 2014, The American College of Emergency Physicians (ACEP) Board of Directors tasked the ACEP Research Committee with developing an evidence-based agenda for EM firearm injury research. Primary goals included reviewing existing firearm research, identifying gaps in the research, and using rigorous consensus techniques to develop a research agenda. Our report explicitly differs from firearm injury research agendas proposed by the Institute of Medicine,[12] by focusing on pressing clinical and preventive questions relevant to emergency medicine.

Goals of this Investigation

A technical advisory group for the ACEP Research Committee used Nominal Group Technique to develop an EM-focused firearm injury prevention research agenda. The group considered both research to be done in EDs, and EM-relevant research of other types. The objective of this manuscript is to present the consensus research agenda that resulted from the Committee's work.

METHODS

Study Design and Setting

We recruited a technical advisory group of national content experts and used Nominal Group Technique (NGT) to identify critical EM-focused firearm injury research questions.[21, 22]

Selection of Participants

Between November 2014 and January 2015, we identified a technical advisory group based on previously published firearm injury prevention research, association with professional societies involved with EM-related injury prevention studies, and personal recommendations from leading researchers in the field. Our goal was to assemble a group of content experts, with a consolidated focus on public health research and management of firearm-related injuries. The final group consisted of 27 members (complete list in Appendix 1).

Consensus Methods

We used the widely accepted NGT to develop actionable, consensus-based research questions. The NGT is a systematized method for collecting data and developing consensus in a small-group setting, by recruiting content experts closely associated with a topic.[21, 22] NGT involves four steps: 1) idea generation, 2) round-robin presentation of ideas and further idea generation, 3) structured discussion and clarification of ideas (at which time, ideas are checked for duplication and groupings are made), 4) ranking of preferred ideas, resulting in a prioritized list.[21–23]

NGT was chosen over other consensus approaches, such as the Delphi Technique, because the ultimate goal was a list of research questions, not necessarily a convergence of opinion.[21, 24] It facilitates the generation of a greater number of ideas than traditional group discussions. It also balances the influence of individuals, so no individual can have excessive influence, limiting group process biases. Finally, the NGT results in a prioritized list, a goal of our work[24–26].

The group and process were specifically structured to address potential limitations to the technique.[22] NGT requires an experienced team leader; both chairs had used the technique previously. [27–29] It requires group members to participate in highly structured meetings over a period of time; all TAG members were consistently involved with the process. Expert bias may exist, but one of the chairs (MNS) lacked expertise in this specific topic and focused more on the process, thereby limiting this bias. Potential bias by dominant individuals was purposefully minimized through use of the round-robin technique and by purposeful solicitation of opinions from less vocal group members.

The advisory group participated in 5 conference calls and 2 consensus-generating meetings from January 2015 to January 2016. The advisory group chairs (MLR, MNS) moderated each session. Written minutes were kept by ACEP staff.

Process and Outcomes

Phase One: Structuring the Process—Our first objective was to structure the consensus process. The group elected to focus on five widely accepted categorizations of firearm injury: self-directed violence (suicide and attempted suicide); intimate partner violence; peer (non-partner) violence; mass violence; and unintentional (“accidental”) injury.[30] Subgroups of up to five members were assigned to each topic. The Haddon Matrix, a common injury prevention research model, was used to structure each subgroup’s initial work.[31]

Phase Two: Generation, Discussion, and Iterative Refinement of Questions—Each subgroup conducted a literature review on its topic and developed a preliminary list of research questions guided by The Haddon Matrix. During the first in-person session, each subgroup delivered an initial list of research ideas; a round-robin process was then used during which all group members proposed additional research questions. Additional conference calls were then held to iteratively refine the extensive list of research questions. Throughout, input was actively solicited from those group members who missed any given session. During this phase, the group noted that certain questions were common among multiple types of injury; thus, the group separated out a category of “cross cutting” questions.

Phase Three: Finalization—We used a two-phase voting process. The first step involved an internal online rank-order system that group members used to establish priority. The mean priority values for each question set and individual questions within each set were calculated. The members established consensus by eliminating questions that met predetermined criteria, specifically those questions that fell greater than 1 standard deviation above the mean AND were not ranked as “highest priority” within that group by *any* voting

member. We held a second in-person session following this vote to further refine the remaining questions. During the second phase of voting, we presented the topic questions to external stakeholders: members of the ACEP Research Committee and Public Health and Injury Prevention Committee. Feedback was reviewed and integrated into the actionable research questions in the final conference call.

RESULTS

In *Phase One*, 61 questions were developed. In *Phase Two*, this list was expanded to 222 questions. After refinement and separation of cross-cutting questions, a list of 63 potential questions remained. In *Phase Three*, 26/27 advisory group members (96%) voted; four questions were removed from the list. Further feedback on the tentative list was obtained from 21 outside experts from the ACEP Research and Public Health and Injury Prevention Committees. Fifty-nine final questions were retained (see Tables 1–7).

DISCUSSION

To reduce the immense medical and public health burden of U.S. firearm injury, high quality firearm injury prevention research is needed. Using validated approaches, our technical advisory group identified critical, EM-relevant research questions related to self-directed violence, intimate partner violence, peer violence, mass violence, and unintentional injury, as well as numerous cross-cutting questions. These questions are aimed both at improving ED care, and at facilitating EM-relevant prevention efforts in EDs and elsewhere. It is intended to serve as a guide for funders and researchers. These recommendations explicitly extend beyond, and have greater clinical relevance than, others' firearm injury research agendas.[12] Given the lack of current firearm research funding,[32] increased funding for investigator-initiated grants, research networks, and collaborative multi-disciplinary research from federal research institutes (e.g., NIH, CDC, and the National Institute of Justice) and philanthropy is needed to address these EM-relevant questions.

Cross-Cutting Themes (Table 1)

Emergency physicians regularly address acute and future health concerns among their patients.[33] The first step in the prevention of firearm injuries is identifying patients at increased risk.[34] Just as universal suicide risk screening is currently under debate,[35, 36] universal screening for risk of firearm injury may not be feasible, acceptable, valid, or effective in the ED. Although some preliminary work has described the characteristics of patients injured by firearms,[9] additional work is needed to define *who* should be screened. Different wording and modalities may need to be considered for different populations (e.g., children versus adult).[37, 38] While valid ED-based screening instruments exist for conditions which may lead to firearm injury (such as partner violence,[39] alcohol,[37] and suicide[40]), to our knowledge no literature exists on ED-based instruments that identify patients at risk of firearm injury. The creation of a predictive analytic algorithm[41] may be particularly helpful to guide clinicians.

The field of injury prevention has standard approaches for intervention development, such as the "4 Es" (education, engineering, enforcement, and economics) and "SBIRT" (screening,

brief intervention, and referral to treatment).[30, 42–44] It is unknown whether these approaches are appropriate for firearm injury prevention interventions in the ED. A few studies (discussed below) describe efficacious interventions for specific injury types, such as suicide or peer violence. Most research on firearm injury prevention interventions has been conducted outside of the ED.[45] Future work should determine the theoretical basis, format, and demographic tailoring of ED-based interventions to prevent all types of firearm injury, and to reduce harm after an injury or death has occurred. Interventions must then be rigorously developed and tested for efficacy, effectiveness, and disseminability. Future work should also examine how best to prevent future consequences (e.g., PTSD) for patients, family members, and for clinicians following all types of firearm injury.

Research also needs to be completed elucidating knowledge, attitudes, and beliefs of stakeholders regarding ED-based screening and counseling for firearm injury risk. Such stakeholders may include ED clinicians, pediatricians, parents, gun owners, and others. Numerous barriers to screening and intervention likely exist, including: time constraints in busy EDs;[46] limited patient receptivity to questions;[47] and lack of knowledge about or training in counseling techniques.[48] Other possible barriers include the potential for unintended consequences of screening and liability issues. These need to be elucidated.

On a larger scale, emergency physicians have traditionally been involved in the surveillance of injuries, ranging from overdose to child abuse. The epidemiology of firearm injury among ED patients remains largely unknown, due to limitations in existing, hospital-coding based surveillance systems.[49–51] Efforts to establish patterns of injury, risk factors, and firearm injuries' relationship to and effect on the larger community are hampered at multiple levels: by restrictions on research funding; by lack of standard outcome measures; by legal and regulatory issues surrounding firearm injury research; and by lack of standardized datasets. Finally, it is unknown to what extent existing laws and policies, or the perceptions thereof, may change clinicians' and patients' willingness to discuss firearm injury in the clinical setting.[52]

Suicide (Table 2)

EDs are a key site for suicide prevention. Up to 10% of adult ED patients have had recent suicidal thoughts or behaviors,[53, 54] and firearm access in the home is one of the strongest and most well established risk factors for suicide death for all household members.[55–58] Factors that influence method choice and the nuances in the epidemiology of firearm suicide (e.g., differences in firearm suicide plans among different demographic groups) remain largely unknown, and have clinical relevance to emergency physicians.

Knowledge gaps exist regarding emergency physicians' screening for firearm access in those at risk for suicide. Issues specific to the realm of suicide include the following: provider attitudes;[46, 59, 60] relative responsibilities of ED providers and mental health consultants; decision-making capacity regarding firearm storage; role of family members in these discussions; and legislation related to options for temporary firearm transfer or storage.[61]

As firearm suicide has a case fatality rate of 90%, versus 10% for all other methods combined,[4, 62, 63] reducing access to firearms and other lethal means among those with

suicide risk may prevent suicide deaths,[64] and is part of the National Strategy for Suicide Prevention.[65] Lethal means screening and counseling (i.e., counseling about reducing access to lethal means) for suicidal ED patients is recommended,[66, 67] and provider training adapted for EDs exists[68], but there are gaps in current research to guide ED implementation [35, 60, 61, 69] and efficacy[67, 70]. Barriers to address include ED providers' unfamiliarity with options for safe firearm storage, inadequate provider training on counseling,[59] and unanswered questions about the best messages and messengers for the counseling.[61] Novel collaborations with firearm retailers have offered a new way to educate firearm owners about suicide prevention;[71] such collaborations could address ED-specific issues (such as temporary firearm storage). For patients who present after a firearm suicide attempt, research questions relate to long-term prognosis, including factors affecting the likelihood of re-attempt and the methods used in re-attempt.[72]

Intimate Partner Violence (Table 3)

Intimate partner violence (IPV) victims commonly present to the ED,[73] and emergency providers regularly screen, identify, treat, and refer these patients.[74, 75] Half of IPV deaths involve a firearm,[76] victims of IPV are twice as likely as the general population to live in a household where a firearm is present,[77] and the presence of a firearm in the home increases the odds for intimate partner homicide five-fold.[78] While the presence of firearms seems to modify the trajectory of IPV, little is known about *how* it does so; this information is directly relevant to EPs attempting to counsel and refer IPV victims.[79]

For instance, the Danger Assessment is useful for assessing risk of IPV survival, but its applicability to ED patients needs further evaluation.[80, 81] Similarly, the value of screening IPV perpetrators for risk of firearm injury perpetration in the ED setting has not been assessed.[82] EM-specific research could elucidate the role of firearm ownership and access in understanding perpetration risk, and clarify the role of firearms in the trajectory of IPV after an ED visit.

Even if emergency medicine providers are able to moderate the risk of firearm-related IPV by screening, the effect of screening and reporting on patients' willingness to disclose IPV is unclear. It is also unknown whether the likelihood of reporting IPV is influenced by perpetrators' or victims' firearm ownership, nor whether screening itself affects risk of intimate partner violence injury or death.

Given that both firearm injury and IPV implicate collaboration between the medical care system and law enforcement, another area with significant research opportunities for EM is "live forensics." A best-practices approach to sexual assault, for example, involves the use of dedicated response teams, familiar with and trained in forensic concepts such as evidence collection, chain of custody, and others.[83] Applying such an approach to IPV – especially high-risk IPV incidents involving firearms – might enhance secondary prevention of IPV-related injury. Finally, laws allowing forfeiture or seizure of firearms in the context of a restraining order[84] may result in a 5–20% reduction in IPV deaths when enforced, but their efficacy and applicability in the context of an ED visit is unknown.[85, 86]

Peer Violence (Table 4)

Firearm injuries resulting from peer (non-intimate-partner) violence account for nearly 37,000 ED visits annually and disproportionately affect youth and young adult populations in low-resource and minority communities.[3, 87] EDs are an important, but underutilized, setting for preventing firearm injuries due to peer violence.[88]

Unanswered research questions remain regarding the epidemiology of firearm assaults, the long-term sequelae of firearm assault injuries, and the efficacy of individual- and community-level interventions—especially interventions that originate in the ED. Longitudinal studies, including observational studies of at-risk ED populations, and outcome studies testing the efficacy of individual and community-level interventions are necessary to advance the science of firearm violence prevention.

Healthcare-based studies of peer violence have focused on understanding the epidemiology, health disparities, and individual-level risk factors associated with firearm-related assaults [89–9293, 9, 94] Such studies have demonstrated, for instance, that among assault-injured youth seeking ED care, 25% have a firearm, with 80% of these firearms acquired through non-legal channels.[95] Few studies, however, have examined contextual factors associated with firearm acquisition and use, the factors that lead to escalation of violent conflict to lethal means, or the contextual determinants of recurrent firearm violence. These studies are directly relevant to emergency physicians caring for assault-injured patients.

While community-based studies have shown that firearm-related peer violence aggregates in certain geographic areas, and that neighborhood characteristics increase this risk,[96–100] little information exists on what factors determine whether youth will experience multiple acts of peer violence, particularly firearm-related peer violence. ED studies can address these issues. For instance, examining repeated versus single ED visits for firearm-related cases of violent assault may inform and focus public health and ED-initiated injury prevention efforts among high-risk populations. The long-term sequelae of firearm injury resulting from peer violence, such as mental health, chronic disease, and health-related behaviors, could also be defined through EM research.[101]

Interventions to prevent and reduce consequences of firearm-related peer violence also require further investigation. A collaborative care intervention focused on decreasing PTSD symptoms among traumatically injured adolescents is the only intervention to date demonstrating decreased rates of weapons carrying at follow-up.[102] Increasing numbers of hospital-based violence prevention programs have been developed, which identify assault-injured youth during a hospital visit and link them to resources to reduce recurrent injury.[103–106] While these programs have shown promise in ED studies,[88, 103–111] they have not specifically focused on youth firearm injuries or firearm-specific outcomes. Single session screening and brief interventions incorporating motivational interviewing[112] and cognitive behavioral therapy have also shown efficacy at reducing violence and/or drug use among at-risk adolescents.[113] However, prior efficacy studies among youth at risk for violence have not led to concurrent work focused on how to prevent *firearm* injury among the similar populations. Further research is also needed to understand the specific impact of *community*-level interventions, such as improving neighborhood infrastructure[114] and

community-based violence interrupter programs,[115–118] on firearm assaults and therefore on ED visits.[119]

Mass Violence (Table 5)

Mass firearm violence is distinct from other forms of firearm injury and death. Although it lacks a standardized definition, many sources rely on a specific number of fatalities[120–123] (versus an “active shooter incident,” which has no victim count inherent to its definition[124–126]). Most definitions of mass violence were developed by law enforcement to facilitate the apprehension and prosecution of offenders. As such, these existing definitions and research lack relevance for emergency physicians tasked with prospectively determining a patient’s propensity for violence against self or others.[127]

Classification heterogeneity, absent data standards, and the lack of medical case reports about prior assessments of individuals who go on to commit mass violence pose barriers to medical research. Small numbers particularly complicate the study of mass violence and its perpetrators.[126] State and federal reports that describe the verified data for these events are often published in selective literature circles involving governmental or law enforcement entities, which do not cross into EM literature.

The epidemiology of interrupted but credible threats of mass violence is, to our knowledge, unknown. Patients posing a threat of committing firearm-related mass violence are evaluated in EDs, but the number of annual evaluations remains unknown. Retrospective studies of perpetrators of mass violence have identified behaviors and risk factors that may inform clinical estimations of risk,[128] but none, to our knowledge, have been studied in the ED setting. Prospective research is necessary to determine the consistency and predictive validity of identified warning behaviors and cognitions. As firearms are the weapons of choice in most acts of mass violence (77%),[126] firearm access likely augments the possibility of firearm mass violence among already at-risk individuals. Due to a variety of legal and regulatory constraints, the relative influence of pre-existing firearm access on risk of mass violence among high-risk patients, who are often evaluated in EDs, is unknown.

Advancing this area of research may create opportunities to mitigate threats and prevent acts of mass violence. Clinician attitudes and barriers – including fears about requirements for disclosure – must be explored. Future research depends on a means to identify and study patients who pose a risk of firearm violence. The study of firearm access and its role in clinical determinations of danger may require indirect or surrogate variables.

Active shooter plans and bullet-resistant installations, among other solutions, have been developed and implemented in EDs in response to the increasing frequency of acts of mass firearm violence. Many public and private shooter response plans suggest a “run, hide, or fight” component.[129] Despite varying consensus recommendations from federal and state organizations, law enforcement entities, and medical professional groups,[130] the efficacy of existing recommendations on threat mitigation and victim survivability is uncertain and largely unstudied. Finally, although the long-term psychological impact of episodes of mass violence on persons directly exposed[131, 132] and communities as a whole are being

investigated,[133, 134] we know of no publications examining the mental health consequences for emergency clinicians treating victims of mass shootings.

Unintentional Firearm Injury (Table 6)

Unintentional firearm injuries accounted for the death of over 64,000 Americans between 1965 and 2006.[135] Approximately 16,000 individuals sustain nonfatal, unintentional firearm injuries each year in the United States.[3] Emergency physicians provide counseling on a variety of unintentional injuries (e.g., child safety restraints), including unintentional firearm injury.[19] Limited evidence exists to guide these efforts.

To develop successful primary and secondary interventions to reduce unintentional firearm injury, research on the causes and correlates of unintentional firearm injuries is necessary.[136] As described above, existing epidemiologic data is insufficient. Such research could inform the development and implementation of targeted interventions for subgroups at highest risk of unintentional firearm injury.

Little has been done to understand the beliefs and goals of key stakeholders in EM unintentional firearm injury prevention. Rigorous research could: (1) identify interventions that would have significant stakeholder support; (2) help determine potential barriers to and mediators of successful efforts; and (3) facilitate collaborative research and primary and secondary prevention efforts based on the identified shared goals among the stakeholders in unintentional firearm injury.

Healthcare providers may effectively interact with both gun-owning and non-gun-owning patients to enhance awareness about unintentional firearm injury prevention. For example, more than half of firearm-owning households in the United States store a gun unlocked and/or loaded.[137] Research shows a lower risk of unintentional firearm injuries in households that practice safe firearm storage.[56, 138] Several professional societies, including ACEP, endorse safe gun storage to reduce firearm-related injuries.[87, 139, 140] The effectiveness of ED-based interventions to promote safe storage practices remains limited. Rigorous research is needed to identify effective communication strategies with parents and patients about their role in reducing unintentional firearm injuries.

Advanced technologies, such as personalization of weapons or “smart” guns, may also aid in unintentional firearm injury prevention by decreasing unauthorized or unintentional discharge.[141] Almost no research examines the impact of these advanced technologies on unintentional firearm injury.

Little is known about the psychological sequelae for patients or communities after unintentional firearm injury. An important distinction for future research is that an unintentional injury can be self-inflicted or other-inflicted. In other-inflicted events, the most common scenario is a child playing with a gun who unintentionally shoots another individual.[136] In these events, almost half the time the shooter is male and from the same family, often a brother; in most other cases the shooter is an acquaintance.[136] Many times the victim and shooter are young with many anticipated years of life ahead of them.[136] In these cases, the “costs” of unintentional firearm injuries are not solely those of the victim

and his or her family, but also include the shooter and his or her family.[136] Investigations into the psychosocial impact and potential psychological sequelae experienced by all individuals impacted by unintentional firearm injury can guide post-injury interventions to address psychosocial needs following injury.

Limitations—Although collective expert bias is always a possibility when using consensus techniques, the nominal group technique is designed to minimize the influence of group dynamics or even a single individual on the outcome. As described in the methods section, explicit attempts were made to minimize potential sources bias during the process (such as inclusion of non-firearm-injury researchers, use of the round robin technique, and solicitation of outside opinions from non-EM researchers and from two ACEP Committees prior to finalization of the list). Moreover, it is important to remember that this technique is designed to examine qualitative, subjective components of a topic and gain consensus. It is not designed to be a problem-solving tool. Quantitative statistical methods should be applied to future studies generated from this agenda to assess the validity of any hypothesis in question.

CONCLUSION

Through our validated consensus group process, we identified key EM-relevant firearm injury prevention research questions. Critical research questions exist in multiple domains of injury, with little existing EM-specific data for most questions. Funders and researchers may consider increasing their attention to these topics.

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TABLE 1

"Cross-cutting" EM Relevant Firearm Injury Research Questions

Directly Relevant to ED Clinical Practice

1. In which healthcare settings (primary care, ED, psychiatry, pre-hospital, etc.) are firearm injury prevention screening and interventions feasible, acceptable, effective, and cost effective?
2. Which screening and intervention modalities (e.g., electronic, face to face, written) are effective for each of the key domains in firearm injury research?
3. What are the moderators of acceptability and effectiveness of screening and interventions (e.g. demographics, state-specific legislation, reasons for gun ownership, political views, specific patterns of substance use), for both clinicians and for patients?
4. What types of tailoring increase screening and interventions' acceptability and effectiveness? For whom?
5. Should screening to assess the risk of (each type of) firearm injury be universal? If selective, what factors (e.g. childhood injury patterns, history of ED visits, demographics, prior violence, mental illness, specific patterns of substance use) need to be considered for a valid assessment of firearm injury risk?
6. What is the effect of various types of interventions on both short- and long-term outcomes (e.g. PTSD, chronic pain, future injury, etc.) after a firearm injury?
7. What are the positive and negative outcomes of firearm injury prevention screening and interventions?
8. What are the confidentiality, legal, regulatory, and compliance issues that impact research and clinical care regarding firearm injuries?
9. How can healthcare providers most effectively engage and collaborate with firearm owners on the topic of firearm injury?

General EM-Relevant Research

10. To what extent is the prevention of firearm violence (compared with prevention of other types of injury or violence) unique?
11. What is the relative effectiveness of educational, engineering, enforcement, and economic interventions to prevent firearm injury? Does the effectiveness of these programs differ for specific subgroups, e.g. perpetrators vs victims?
12. What is the community-level effect of firearm injury and exposure (including costs, biomedical outcomes, psychological outcomes, and social/economic conditions)?
13. What is the effect of the community on firearm injury patterns, within and across different types of injury? *
14. What types of research approaches (e.g., enhanced data reporting systems) would improve the study of firearm injury?
15. What are the right outcome measures for firearm injury research? (Decreased deaths? Decreased non-fatal injuries? Improved safe storage? Decreased firearm carriage? Other?)
16. To what extent do policies and their variable enforcement affect risk of each subtype of firearm injury, on the level of both the individual and the population? *

* maps to similar priorities as Institute of Medicine/National Research Council's 2013 consensus report[12]

TABLE 2

Suicide-Related EM-Relevant Firearm Injury Research Questions

Directly Relevant to ED Clinical Practice
1. What are the knowledge, attitudes, and beliefs of key stakeholders (e.g. healthcare providers, families, patients) that may facilitate or impede lethal means restriction for suicidal patients?
2. What are the consequences (if any) of firearm screening among suicidal patients? Does it dissuade them from seeking care?
3. Is failure to screen for firearm access in a patient with suicide risk malfeasance or breach of duty by the physician?
4. How does, and how should, knowing that a potentially suicidal patient has a gun at home influence disposition decision? (What should the standard of practice be?)
5. What are barriers and facilitators to ED provider counseling of suicidal patients (and family members) about lethal means?
6. What factors increase the acceptability of lethal means restriction for at-risk patients? E.g., with whom are at-risk persons most comfortable temporarily storing their firearms?
7. To what extent do ED interactions with suicide hotlines/other community partners affect patients' lethal means access post discharge?
General EM-Relevant Research
8. What factors, including online and in-person social networks, affect initial suicide method choice and method substitution?
9. What is the epidemiology of firearm suicide? Specifically: how does gun ownership, storage, gun origin, etc., vary across various demographic groups (e.g. youth, veterans, etc.)?*
10What is the effect of firearm access restriction on future suicide behavior?*

TABLE 3

Intimate Partner Violence (IPV)-Related EM-Relevant Firearm Injury Research Questions

Directly Relevant to ED Clinical Practice

1. When screening for firearm injury risk in IPV, is it more effective to start by asking about gun access and move to IPV perpetration risk, or vice-versa; or is the proper order situational?
2. Retrospectively, what medical and legal characteristics distinguish perpetrators of firearm-related IPV from perpetrators of other crimes and/or from other ED patients?
3. What are the feasibility, acceptability, and predictive value of the Danger Assessment for firearm-related IPV among ED patients?
4. How does presence or threat of a firearm influence patients' propensity to disclose IPV in the ED setting?
5. What is the effect of IPV-related firearm legislation on patients' and perpetrators' disclosure of firearm ownership in the ED setting?
6. What are the feasibility, acceptability, and effectiveness of dedicated IPV Response Teams (similar to Sexual Assault Nurse Examiner programs) for high risk IPV patients in the ED setting?

General EM-Relevant Research

7. What are the risk factors for IPV-related firearm injury, among both victims and perpetrators?
8. How do IPV events differ between gun owners and non-gun owners?
9. Among gun owners, what determines whether a gun is used in an IPV event?*
10. What is the effect of IPV-related firearm legislation, such as firearm forfeiture programs for people under an IPV restraining order, on IPV incidence and severity?*

TABLE 4

Peer Violence-Related Firearm Injury Research Questions

Directly Relevant to ED Clinical Practice

1. What is the role of acute ED care (e.g. staff interactions, pain medication, invasive procedures) in development of post-traumatic stress syndrome?

General EM-Relevant Research

2. What is the relative impact of community-based violence interventions, community policing, and other community-based prevention efforts on firearm-related assaults?*
3. What is the effect of social media use, including cyber bullying, on the incidence/likelihood of firearm assault?*
4. What approaches are most effective in reducing racial and ethnic disparities in firearm-related assault?*
5. To what extent do firearm injury events cluster geospatially, in relation to retaliation from prior violence as well as to place-based environmental factors (alcohol outlets, green space)?*
6. What factors influence the likelihood of someone carrying or acquiring a firearm?*
7. What is the relationship between violence exposure, PTSD and future firearm acquisition?*

TABLE 5

Mass Violence-Related Firearm Injury Research Questions

Directly Relevant to ED Clinical Practice

1. What definition of "mass violence" is clinically relevant to acute and episodic care?
2. Are there specific signs, symptoms, or types of presentation that should trigger a clinician's safety concern for more than one person (besides the patient him/herself)?
3. To what degree is a patient's firearm access relevant to clinical decision making about risk of mass violence?
4. What are the knowledge, attitudes, and beliefs of clinicians that may facilitate or impede assessment of risk of mass violence?
5. Does physician level of concern for mass violence correlate with actual risk of mass violence?
6. Is the threat of violence in the ED setting a sentinel event for completed violence (i.e., the same clinical/longitudinal construct)?
7. To what extent do active shooter plans and infrastructure changes (bulletproof glass, metal detectors, EMS protocols, etc.) affect incidence of, and morbidity/mortality from, ED mass shooting events?

General EM-Relevant Research

8. Are there particular firearm-related characteristics (for example, firearm capacity; amount of time since firearm acquisition) that correlate with risk of mass violence?
9. What is the epidemiology of PTSD, anxiety, depression, and other mental health disorders among communities and providers exposed to mass violence?*

TABLE 6

Unintentional Injury-Related Firearm Injury Research Questions

Directly Relevant to ED Clinical Practice

1. How can emergency care providers effectively interact with parents and patients to enhance their knowledge about and increase their responsiveness to preventing unintentional firearm injury, including practicing safe gun storage?

General EM-Relevant Research

2. What are the risk factors for unintentional firearm injury among specific demographic subgroups?*
3. What are the knowledge, attitude, and beliefs of key stakeholders that may facilitate successful individual-level and community-level interventions to prevent unintentional firearm injury?
4. How do safe storage methods help prevent unintentional firearm injuries?*
5. What specific methods are most effective in reducing the risk of sustaining unintentional firearm injuries?
6. What effect do gun technologies (i.e. smart guns, personalized guns) have on the risk of unintentional firearm injury?*
7. How do unintentional firearm injury survivors' psychological outcomes differ from survivors of other types of gun injuries?