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Invited Commentary

FIREARM VIOLENCE

Firearm Violence as a Disease—"Hot People" or "Hot Spots"?

Charles C. Branas, PhD; Sara Jacoby, PhD; Elena Andreyeva, PhD

In this issue of *JAMA Internal Medicine*, Green and colleagues¹ report on firearm violence in Chicago, Illinois, from 2006 to 2014 and show how the violence is transmitted by social interaction through networks of people. The study establishes that the spread of firearm violence can be understood with parameters that have been used for more than half a century to model the spread of infectious diseases. This important finding helps put to rest the mistaken idea that epidemiology, medicine, and public health somehow have no place in the prevention of firearm violence, a disease process that affects roughly 100 000 people in the United States each year.^{2,3}

Firearm violence is a problem that many fields, including criminology, sociology, and law enforcement, have contributed to better understanding and preventing. However, when a person is shot with a firearm in the United States, there is more

than just a police and justice system response. If the person survives long enough, he or she will be treated by emergency medical services professionals and then at a trauma or other medical center; if the person dies, a medical examiner or coroner will likely conduct an autopsy. Substantial medical and public health resources are expended in responding to firearm violence. Correspondingly substantial biomedical research resources are also needed to better understand and prevent this acute and often fatal pathophysiological process.³

Although the study by Green and colleagues¹ provides innovative quantitative evidence, modeling the transmission of firearm violence as an epidemiological phenomenon is not new. Most prior studies, however, have documented ecological transmission between neighborhoods or other groups of people (eg, gangs and peer groups). A few studies have applied mathematical models to person-to-person transmission of firearm violence⁴; however, these studies have been simulations. In contrast, Green and colleagues¹ took an important next step

of analyzing network data from a large cohort of actual people in a major US city.

The transmission of firearm violence does not necessarily result from another person who has experienced violence. Two people who both experience firearm violence may simply be drawn from the same environment or group, which increases their general exposure to firearm violence. Because more than half of the firearm victims in the sample of the study by Green and colleagues¹ had known gang affiliations, it is possible that these affiliations influenced their probability of being shot as much as being acquainted with another victim of firearm injury.

The authors suggest that network analysis can be used to support interventions, such as the deployment of community workers whose job it is to interrupt violence, or hospital-based violence intervention programs for high-risk individuals. Studies of these approaches were recently presented at a National Academies workshop.⁵ These new studies evaluated the effect of street outreach workers on the occurrence of firearm violence in several US cities, including Chicago. The results have been mixed; interruption of person-to-person transmission of violence may have value, but further research is needed.

At the same National Academies meeting, participants sought to distinguish interventions focusing on high-risk individuals, referred to as “hot people,” from interventions focusing on high-risk locations, or “hot spots.” Perhaps focusing on select individuals, that is, hot people who are hypertransmitters of violence, will have value. However, it is now commonly thought that changing the environmental context within which health problems occur is essential and at times may be more effective than focusing only on individuals. In the words of one author, “[I]f a brackish tidal pool is breeding mosquitoes...filling it in...may be far more likely to continue reducing the incidence of malaria...years after funding has run out than...expecting local community members to continue regular applications of larvicide.”^{6(p777)} This reasoning also applies to firearm violence: individuals who are simply instructed to adhere to safe practices with firearms are unlikely to be successful if the context within which they find themselves day after day does not permit it.

Avoiding the profiling of “high-risk” individuals and directly changing the hot spots that promote firearm violence are important.⁷ Even when programs focused on individuals are successful, new high-risk individuals will still cycle through high-risk environments that, if left unchanged, will continue to provide the basic substrate for violent behavior and injury. Interventions that focus on high-risk individuals may be short-lived and heavily dependent on the sustained infusion of funds and professional resources. For instance, despite short-term reductions in violence, when police, social workers, or other community-based workers seeking to interrupt violence leave an area, either because they have been reassigned elsewhere or their funding has expired, the violence that was previously in that area has been shown to return.⁸

Therefore, a sole focus on hot people as part of firearm violence prevention programs, although potentially fruitful in the short-term, may not produce sustained success. A broader focus that includes the negative structural contexts (eg, poverty and blight) in the hot spots that ultimately produce the hot people may increase the prospects for long-term success. Place-based and contextual interventions, such as fixing up abandoned buildings or greening vacant lots, can often address the underlying reasons that allow potential offenders, victims, and firearms to come together in the first place. There is now evidence from quasi-experimental and randomized controlled trials, conducted in Chicago and other cities, showing the effectiveness and cost-benefits of programs to remediate urban blight in significantly decreasing firearm violence.^{7,9,10}

Firearm violence is complex and in need of research and treatment investments comparable to those we have long relied on for other disease processes.³ The study by Green and colleagues¹ has shown a bright light on the concept that firearm violence is transmitted via parameters that make it akin to an infectious disease. Moreover, the diffusion of firearm violence is influenced as much by contextual, place-based structures that underpin networks of individuals as it is by the individuals who are in the networks themselves. To reduce firearm violence in the United States, we should invest in ideas and interventions that focus on both people and places.

ARTICLE INFORMATION

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