The Effectiveness and Costs Associated with Hospital-based Violence Intervention Programs

Sarah Nusbaum, Adrian Giovanni Medina, Bohree Kim, Sarah Torosyan, and Seth R. Narine

Abstract
Many healthcare organizations around the United States have developed and implemented Hospital-based Violence Intervention Programs (HVIPs) with the goal of addressing the pressing public health challenge of intentional violence. This literature review discusses the existing evidence on the efficacy of HVIPs, including the components necessary in highly successful models, barriers to success, and cost-effectiveness. The presented literature includes relevant studies published within the last 20 years and guided by four predetermined research questions around the necessary components of effective HVIPs; barriers to success in developing and implementing HVIPs; the impact of HVIPs on recidivism for intentional injuries in individuals ages 15 to 24; and the cost-effectiveness of HVIPs. The literature suggests that HVIPs are beneficial for healthcare organizations, as they generally reduce recidivism rates and contain costs. More research is needed on the ancillary benefits that these programs provide to individuals with intentional injuries. Although a limited number of these programs have been thoroughly evaluated, existing studies have illuminated best practices, including intensive case management, hospital leadership buy-in, and strong partnerships between hospitals and CBOs. These best practices can help to mitigate common barriers, such as identifying eligible HVIP participants and coordinating the program with internal and external stakeholders.
**Introduction and Background**

Intentional violence is a pressing public health challenge in New York City (NYC) and around the country, with approximately 1.69 million nonsexual assaults treated in hospitals in 2011 alone.\(^2\) This is a particular challenge for young people who are heavily impacted by violent injuries and also have a high risk of recurring violence-related injuries, posing not only a tragic loss of potential but also a financial strain on the healthcare system and society at large. It is estimated that more than 700,000 people aged 10 to 24 present to emergency departments annually due to non-fatal violent injuries.\(^1\) Further, losses due to mostly worker and household productivity resulting from violent injury are approximately $70 billion nationally.\(^2\) In New York State between the years 2012 and 2014, there were more than 82,000 emergency department visits related to homicide and assault injury.\(^3\) Victims of intentional violence are more likely to retaliate or engage in further acts of violence, perpetuating a cycle of violence and causing many victims to repeatedly present with injuries due to intentional violence.\(^31\)

To address this challenge, many healthcare organizations around the United States have developed and implemented Hospital-based Violence Intervention Programs (HVIPs) with the goal of identifying and intervening with victims of intentional injuries to prevent future violence. HVIPs provide victims of intentional violence with services and resources to reduce the likelihood that they will engage in violent retaliation or other violent acts in the future. While the services provided and the target populations vary, the programs share a foundational assumption that hospitals are ideal locations to not only find people at risk of future intentional violence but also provide a respected and safe space for victims to receive services. Further, all programs recognize the importance of addressing other social determinants of health in providing victims the stability needed to change their violence-related behavior.

Many HVIPs around the country have shown impressive outcomes at reducing recidivism rates and saving costs. In NYC alone, the Department of Health and Mental Hygiene (DOHMH)-managed violence-reduction program, Cure Violence, was found to reduce gun injuries by almost 60 percent.\(^4\) As these models continue to expand, further evaluations are needed to illustrate best practices and encourage sustainable funding and scaling of effective models. The following literature review discusses the existing evidence on the efficacy of HVIPs, including the components necessary in highly successful models, barriers to success, and cost-effectiveness.

The NYC DOHMH has commissioned this literature review to inform their efforts to evaluate and maximize the benefits of the Cure Violence program, which has 18 existing sites across the City. Currently the 18 sites are composed of both hospital- and community-based interventions. For the purposes of this literature review, DOHMH is especially interested in the efficacy and costs of hospital-based interventions to inform growth and sustainability in NYC. Further, in
alignment with programmatic goals, DOHMH is interested in interventions focusing on individuals aged 15 to 24.

Methodology
The presented literature was found through searches of Google Scholar, the New York University library database, and the National Network of Hospital-based Violence Intervention Programs database. Keywords used to search for articles were HVIPs, hospital-based violence intervention programs, cost-effectiveness, violence prevention, recidivism, and payment models. Relevant studies and reviews published within the last 20 years were considered for inclusion. Four predetermined research questions, outlined in the findings section, guided the search and selection of 28 publications. In addition, DOHMH provided nine articles that were identified as relevant to the purpose of the review. While the selected articles have different criteria for the age of the target population served, the 28 publications selected represent a comprehensive sample of those sources assessing the efficacy and cost-effectiveness of HVIPs.

Findings
The findings organized by four guiding research questions, followed by a summary of the gaps and areas for further research.

I. What are the necessary components in creating the most effective HVIPs?
In determining the efficacy of HVIPs, it is also imperative to highlight the components that successful HVIPs share. The literature under review illuminates a set of shared best practices across HVIPs nationally.

Hospital settings. As mentioned, much of the literature outlined the benefits of locating interventions in a hospital setting.\textsuperscript{1,6,25} This setting allows for the timely capture of patients post-trauma when they are most vulnerable and open to an intervention, often called the “teachable moment” in the literature.\textsuperscript{1} This is an ideal time for staff to work with victims to craft their narrative and outlook on the violent event.\textsuperscript{2} This is especially important given that young people in particular use emergency departments as a primary source of care.\textsuperscript{2,5} Further, much of the literature states that victims perceive hospitals to be safe spaces where they are more receptive to support, especially when compared to courthouses or jails (other places where violence-interventions have been implemented).\textsuperscript{26}

Hospital culture. Multiple publications referenced the importance of institutional buy-in when integrating an HVIP.\textsuperscript{7,8} Leadership should be supportive of the initiative and help staff understand both the value and delivery of the program.\textsuperscript{7,8} Further, for the program to be successful, it is necessary for hospitals to allocate resources to the program, including staff and space.\textsuperscript{7,8}
**Strong assessment and screening processes.** Hospitals should have clear workflows allowing staff to identify, collect data on, and connect eligible patients with violence-intervention programs. The initial screening of patient and family needs, specifically tailored towards youth, allow hospitals to determine patient eligibility for treatment and connect them with appropriate services. Cunningham et al. considers initial assessment of the patient’s psychological needs to be one of the four most critical practices in successful HVIPs (2008). Dicker et al. states that hospitals should collect data from patients early-on so they are able to effectively track the patients and later determine the success of the intervention (2017). Walton et al provides a framework for determining the patient population most likely to report severe peer violence and therefore be eligible for HVIP participation (2008). Predictors of violence involvement include alcohol, cigarette, and/or marijuana use, receipt of public assistance, younger age, and identification as African-American.

**Intensive case management.** One of the most frequently cited components of successful models was high doses of case management. Smith et al.’s study highlights that patients who received more than six hours per week of case management were almost 5.6 times more likely to succeed in avoiding violence-related re-injuries than patients with low exposure to case management (2013). Dr. Snider et al. and Cunningham et al. identified wrap-around services that address social determinants of health to be integral to a victim’s success. In particular, case management services for this population should include, where applicable, connection to restitution funds, insurance enrollment, driver’s education, employment, education, court advocacy, mental health services, primary care services, and housing. Of these, Dicker et al. identified unemployment, outstanding legal issues, and housing insecurity to be the three most significant predictors of future violence-related injury. Further, Smith et al.’s study finds that if a victim’s employment needs were met, he or she was four times more likely to achieve success. Case managers should create and coordinate discharge plans that connect patients to appropriate services and mitigate care gaps after they leave the hospital, another one of the four best practices identified by Cunningham et al.

**Relationships with local community-based organizations (CBOs).** In order to successfully connect victims to appropriate services in a timely manner, it is critically important that hospitals with HVIPs have strong relationships with local CBOs. The identification of effective CBOs that specialize in addressing a particular social determinant of health is another one of the four best practices for HVIPs identified by Cunningham et al.

**Integration of behavioral health services into care.** Another heavily referenced best practice is the integration of behavioral health services throughout treatment for victims of intentional violence. Smith et al.’s publication provides evidence that if a patient’s mental health needs were met, they were six times more likely to successfully avoid re-injury, while Cunningham et al. states that the treatment of a patient’s behavioral health needs is one of the
four most critical practices in HVIPs. Dr. Cooper, who oversees the HVIP at Maryland School of Medicine, determined through observation that individual counseling is the most integral service in preventing violence related re-injury.

Culturally-competent care. Finally, in order for an HVIP to be successful, the treatment must be culturally-informed. In order for case managers to effectively use a trauma incident as a teachable moment, they must either have lived experience with violence or working with violence-affected youth. It is imperative that HVIP staff can relate to the young people and build relationships with them quickly. The program should be informed by the community and the victims to identify the issues faced by young people and the root causes of violence. The care should also be age-appropriate and consider local context and demographics. The Child Fatality Review Team Model, an interagency platform which convenes stakeholders from law enforcement, victim services, community groups, education, healthcare, and public health with the goal of reducing violent injuries, identify the specific issues faced by young people in the local community to better meet their needs and prevent re-injuries. The Cardiff Model, which originated in Wales before being replicated in Atlanta, Georgia, provides a platform for hospitals and law-enforcement to share data on areas and times with high-violence rates to develop targeted violence-prevention strategies. Other programs have met community needs by providing parental resources and supports or community mentors.

II. What are the barriers to success in developing and implementing effective HVIPs?
Across the literature, common barriers arise in the implementation and expansion of successful HVIPs, which should be considered in future efforts. Some of these barriers can be mitigated through the integration of the components of successful HVIPs outlined above.

Identifying the appropriate participants. Ensuring that all individuals in the hospital who are eligible for a HVIP are identified and connected to the intervention is critical to program success. However, the literature shows that many hospitals struggle to do so effectively. Errors in e-coding, or the electronic input of a diagnostic code when a patient presents with an injury, can cause the hospital to miss some victims of intentional injury. In addition, victims, especially young individuals, choose not to disclose the intentional nature of their injuries, leading to inappropriate screening.

Lack of coordination. Successful HVIPs rely heavily on both internal and external partners. Dicker et al. provides evidence that hospitals who limit the program to the emergency department are less effective. A lack of community partnerships, surveillance, coordination with the criminal justice system, and connections within all hospital departments are all barriers to success. Thus, lack of stakeholder buy-in can be a significant challenge. Hospital leadership is integral to achieving necessary program exposure, institutional culture-change, and resource allocation, while community partners are crucial to determining program priorities.
**Evaluation challenges.** HVIPs face barriers in conducting program evaluations, which are critical to the sustainability and scalability of models. Data sources that allow programs to track re-injuries regionally, which is important as program participants may use more than one emergency department, are scarce and inconsistent. To address this, the National Network of HVIPs is developing a data-sharing system which will be accessible across the country as it gains momentum. Many program participants have insecure housing and communication abilities, making it even harder to conduct post-program follow-up. Finally, finding sample sizes that are large enough to be statistically significant is a challenge in local programs.

**Funding limitations.** Acquiring enough funding to deliver HVIPs with integrity to the model and to sustain and expand programs is frequently cited as a barrier. This is directly related to the evaluation challenges outlined above, as funding is often dependent on proven outcomes. Most HVIPs are costly to deliver, which is especially true in under-resourced hospitals who have difficulty finding the necessary staff, time, space and availability to consistently deliver HVIP services. Most programs are currently funded by short-term grants, which makes their future insecure.

### III. What are the effects of HVIPs on recidivism for intentional injuries in individuals ages 15 to 24?

Although more research is needed, the literature currently provides evidence that HVIPs which include some components outlined in Question I result in decreased recidivism rates. While the age range varies in the published evaluations, a wide range of ages are represented, suggesting that HVIPs will have a similarly positive effect on individuals aged 15 to 24.

In a review of the published evidence of HVIPs of recidivism on participants aged 14 to 25, Strong et al. found that 17 percent of the eight studies focusing on recidivism saw a significant decrease, with the rest being underpowered or lacking a power analysis. Furthermore, Strong et al. found that two additional studies showed a significant reduction in recidivism. In the seven evaluations examined in this literature review, six showed significant decreases in recidivism and one found no clear results. Of note, the Maryland School of Medicine HVIP saw a significant difference in recidivism rates between their control group at 36 percent and treatment group at five percent, and the Wishard Hospital HVIP at 8.6 percent and zero percent, respectively. Two studies on the Wraparound HVIP which targets individuals aged 10 to 35 in San Francisco, also showed significant decreases, with one study showing a difference of 4.9 percent and the other of 11.5 percent between the control and the treatment groups. Two studies on the Caught in the Crossfire program presented conflicting results with one showing a 1.5 percent difference between control and treatment groups and the other finding inconclusive data. Generally, the evidence shows that HVIPs reduce recidivism rates, sometimes quite drastically.
Other outcomes not related to recidivism rates also highlighted the value of HVIPs. For example, Cooper et al. found that the nonintervention (control) group was three times more likely to be arrested and four times more likely to be convicted of a violent crime than the treatment group. Similarly, Shibru, et al. found that participants who completed the Caught in the Crossfire HVIP were seven percent less likely to participate in subsequent violent behavior.

IV. Are HVIPs a cost-effective solution to reducing recidivism associated with intentional injuries among individuals aged 15 to 24?

In order for policy makers and hospital leaders to invest in the adoption and expansion of HVIPs, the cost-effectiveness of the models must be demonstrable. Eleven published studies examined the cost-effectiveness of HVIPs, however more research should be done on the long-term cost-savings to hospitals, the government, and society.

The costs associated with implementing an HVIP ranged significantly from $3,574 per patient with violence-related injuries at Caught in the Crossfire to $46,000 per patient at the Maryland School of Medicine HVIP. This is noteworthy as it highlights the vast differences in the HVIPs examined in the literature. However, despite these variations, of the 11 studies on cost-savings, 10 found HVIP models to be cost-effective, and one found that while the HVIP did not save the hospital money, it also did not lose the hospital money. Further, a review of 34 recent analyses in the field of violence prevention approaches found that 19 out of the 34 approaches yielded beneficial net societal cost ratios and cost per quality-adjusted life-year (QALY).

Overall, available evidence suggests that HVIPs have contributed to substantial cost savings for hospitals, criminal justice systems, governments, and society at large. The Wraparound HVIP saves their hospital $598,000 per year and the Baltimore HVIP has saved the City more than $1 million in reduced incarceration, hospital visits and increased employment. Shibru et al. concluded that compared to the costs of a juvenile detention center, Caught in the Crossfire resulted in $750,000 to $1.5 million in cost savings. In a criminal justice-based analysis of the potential lifetime costs and benefits of a two-year intensive youth program for 100 individuals costing $500,000, Cunningham et al. estimated that if the program prevented one person from drug use, crime, and disconnection from high school, it would generate a total savings of $1.7 to $2.3 million. Also of note, in a simulated cost-benefit analysis, Purtle et al. concluded that HVIPs could result in a cost savings ranging from $82,765 to $4,055,837.

V. Gaps and Areas for Future Research

There is valuable representation on the efficacy and cost-savings of HVIPs in existing literature. However, the following five primary areas for future efforts have emerged through this review. Remedying these gaps will allow policymakers, funders, and hospitals to better make informed decisions on the adoption of HVIPs.
Ancillary outcomes. Much of the current research examines cost-savings and program outcomes as they relate to recidivism rates. However, the literature has shown myriad other valuable outcomes of HVIPs that should be studied and quantified to capture the full benefit of the programs.\textsuperscript{29} These outcomes include HVIPs meeting clients’ immigration, driver’s license, and employment needs.\textsuperscript{17} In addition, further research should capture HVIP participants’ service utilization, attitude change, aggressive behavior, and likelihood to avoid fighting.\textsuperscript{13,26}

Societal cost-savings. Though a thorough cost-benefit analysis (CBA) is a time- and resource-intensive undertaking, the value of showing long-term cost-savings to both healthcare institutions and society at large cannot be understated. This CBA should include the cost-savings from participating in HVIPs related to education, the criminal justice system, loss of productivity, transportation, healthcare, and household productivity.

Definition of success. There is a lot of variance among program outcomes with no clear guidance on what determines an effective program. A nationwide set of standards around successful HVIPs would help decision-makers strategically fund program continuation and expansion.\textsuperscript{14}

National database. A national database that would allow healthcare providers to track patients and better determine recidivism rates would improve HVIP evaluations and lead to increased funding.\textsuperscript{1}

Payer source. Finally, given that one of the primary challenges faced by HVIPs is sustainable funding, it is critical that more research focused on potential sustainable funding models is undertaken. With the shift towards value-based purchasing in healthcare and an emerging emphasis on tying reimbursements to social determinants of health, there are new government payment mechanisms which should be explored. In addition, evaluations of HVIPs that have been successfully integrated into hospital payment models should be highlighted as case studies in future research.

Conclusion
The discussed articles all explored the efficacy and cost-effectiveness of HVIPs, including best practices and barriers to success. The literature suggests that HVIPs are beneficial for healthcare organizations, as they generally reduce recidivism rates and contain costs. More research is needed on the ancillary benefits that these programs provide to individuals with intentional injuries. Although a limited number of these programs have been thoroughly evaluated, existing studies have illuminated best practices, including intensive case management, hospital leadership buy-in, and strong partnerships between hospitals and CBOs. These best practices can help to mitigate common barriers, such as identifying eligible HVIP participants and coordinating the program with internal and external stakeholders.
This literature review highlights the need for additional research on HVIPs. These programs present a promising model for reducing intentional injuries, thus saving lives and money. The existing literature provides a foundation for further investment in continued cost-benefit analyses and thorough program evaluations of this model. Given the substantial strain on NYC communities and City hospitals, there have been over 960 shootings in NYC since 2017, the potential of HVIPs to mitigate violence and positively impact the health, safety, and wellbeing of the City should not be overlooked.30

This literature review was commissioned by the New York City Department of Health and Mental Hygiene. Any questions should be directed to Clifford Larochel, Director of the Anti-Violence Hospital Initiative, at claroche@health.nyc.gov.
Works Cited


for assault-injured youth presenting to the emergency department: Results of a randomized trial." *Pediatrics* 122, no. 5 (2008): 938.


