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# Implementation of an emerging hospital-based violence intervention program: a multimethod study

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## ABSTRACT

**Background** Individuals who experience assaultive firearm injury are at elevated risk for violent reinjury and multiple negative physical and psychological health outcomes. Hospital-based violence intervention programs (HVIPs) may improve patient outcomes through intensive, community-based case management.

**Methods** We conducted a multimethod evaluation of an emerging HVIP at a large trauma center using the *RE-AIM* framework. We assessed recruitment, violent reinjury outcomes, and service provision from 2020 to 2022. Semistructured, qualitative interviews were performed with HVIP participants and program administrators to elicit experiences with HVIP services. Directed content analysis was used to generate and organize codes from the data. We also conducted clinician surveys to assess awareness and referral patterns.

**Results** Of the 319 HVIP-eligible individuals who presented with non-fatal assaultive firearm injury, 39 individuals (12%) were enrolled in the HVIP. Inpatient admission was independently associated with HVIP enrollment (OR 2.6, 95% CI 1.3 to 5.2; p=0.01). Facilitators of *Reach* included engaging with credible messengers, personal relationships with HVIP program administrators, and encouragement from family to enroll. Fear of disclosure to police was cited as a key barrier to enrollment. For the *Effectiveness* domain, enrollment was not associated with reinjury (OR 0.70, 95% CI 0.16 to 3.1). Participants identified key areas of focus where needs were not met including housing and mental health. Limited awareness of HVIP services was a barrier to *Adoption*. Participants described strengths of *Implementation*, highlighting the deep relationships built between clients and administrators. For the long-term *Maintenance* of the program, both clinicians and HVIP clients reported that there is a need for HVIP services for individuals who experience violent injury.

**Conclusions** Credible messengers facilitate engagement with potential participants, whereas concerns around police involvement is an important barrier. Inpatient admission provides an opportunity to engage patients and may facilitate recruitment. HVIPs may benefit from increased program intensity.

**Level of evidence** IV.

**WHAT IS ALREADY KNOWN ON THIS TOPIC**

⇒ Hospital-based violence intervention programs (HVIPs) may improve outcomes and service utilization among individuals with assaultive injury.

**WHAT THIS STUDY ADDS**

⇒ The RE-AIM framework adapted to an emerging HVIP identified key facilitators and barriers to HVIP recruitment, effectiveness, adoption, implementation, and maintenance.

**HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY**

⇒ This study provides a template for evaluation of HVIPs to improve and standardize implementation, with specific importance for emerging programs.

⇒ This standardization will allow for better critical evaluation of the efficacy of HVIPs and ultimately help guide the development, implementation, and uptake of HVIPs around the country.

## INTRODUCTION

Assaultive firearm injury poses a significant public health challenge in the USA. Over 12,000 fatal and 34,000 non-fatal assaultive firearm injuries occur annually.[1] Assaultive firearm injury disproportionately harms black men and other people of color.[1 2] Individuals who experience assaultive firearm injury are at elevated risk for violent reinjury,[3 4] as well as a broad range of negative physical and psychological health outcomes including physical disability, chronic pain, and post-traumatic stress disorder (PTSD).[5–7]

Hospital-based violence intervention programs (HVIPs) provide intensive, community-based case management to individuals who experience violent injury, with the goal of improving health outcomes.[8] Depending on local resources and individual circumstances, HVIPs may offer a range of services including mental health and substance use disorder treatment, tattoo removal, housing, education, job training, employment, court advocacy, and victim of crime assistance.[9] Although there is no standard set of HVIP services, all HVIPs offer additional resources to address the social-ecological factors that may have contributed to their initial injury and risk of future injury. HVIPs increase service utilization among individuals who experience violent injury and may decrease violence-related behaviors[10–15]; however, it remains uncertain if HVIPs reduce reinjury.[16] One of the reasons for this is that there is inconsistent implementation and definition of the HVIP intervention and no standardized evaluation process for HVIPs across the country. A recent randomized controlled trial evaluated the efficacy of an HVIP and found no statistically significant change in risk of arrest or reinjury after

intervention. However, this finding was thought to be due to the low intensity of the intervention.[17] In this context, implementation science research may be especially informative in defining measures for a 'successfully implemented' HVIP intervention that will allow for critical evaluation of the efficacy of HVIPs and ultimately help guide the development, implementation, and uptake of HVIPs.[18]

The objective of this study was to conduct a multimethod evaluation of an emerging HVIP at a large trauma center. Understanding patterns in HVIP recruitment, service provision and utilization, and perceived facilitators and barriers to engagement may guide future program development. Identification of the core components that facilitate successful HVIP implementation may inform the development of practice guidelines and standardization across programs. We used the RE-AIM framework, a frequently used implementation science framework, for the present study.[19]

## METHODS

This study consisted of a quantitative evaluation of HVIP recruitment and service provision, a qualitative evaluation exploring clients' experiences with HVIP services, and a clinician survey assessing awareness of HVIP services. All results were organized according to the RE-AIM framework, an implementation science framework commonly used in public health.[19] Specifically, our findings are presented in the dimensions of (1) Reach: the number and characteristics of those receiving an intervention; (2) Effectiveness: process and outcome measures of an intervention; (3) Adoption: utilization by eligible practitioners; (4) Implementation: the characteristics and intensity of an intervention; and (5) Maintenance: program sustainability and long-term outcomes.[19] The organization of study findings is summarized in figure 1. This study received approval from the Yale University Institutional Review Board.

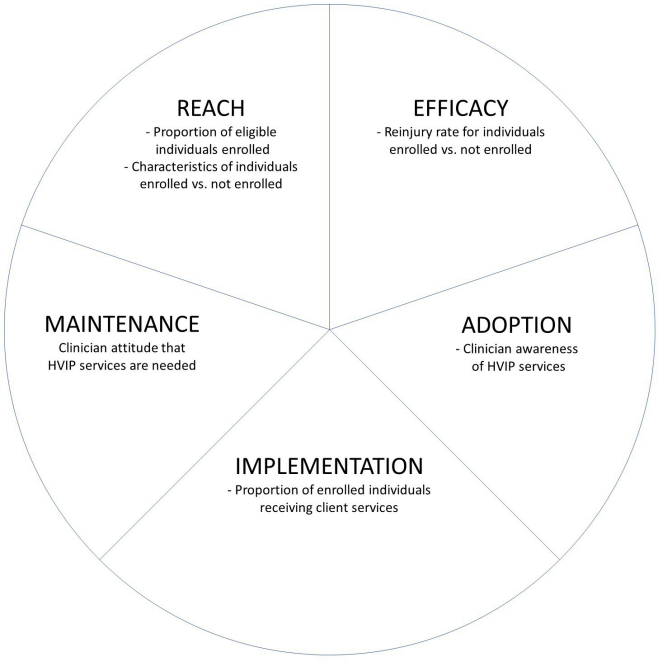


**Figure 1** Study data types organized by dimensions of the RE-AIM framework. HVIP, hospital-based violence intervention program.

### Setting

The Yale New Haven Hospital Violence Intervention Program (YNH HVIP) was established in January 2020. The YNH HVIP team consisted of a licensed clinical social worker, a violence prevention professional with over a decade of experience in community violence prevention, a nurse community outreach coordinator, and a pediatric emergency medicine physician. Case management services were provided by the licensed clinical social worker and violence prevention professional. The YNH HVIP operated in partnership with other community organizations that provided services to individuals who experience violent injury. All individuals (adults and children) who presented to the study center emergency department with assaultive firearm injury were automatically identified from the electronic medical record (EMR) and were considered for enrollment in YNH HVIP. Although selected individuals with other mechanisms of assaultive injuries were referred to YNH HVIP, this analysis is restricted to those with firearm injury. Of note, the program was initiated shortly prior to the emergence of the COVID-19 pandemic, which impacted program implementation and may have affected the outcome measures reported here.

### Quantitative evaluation

#### Participants

All individuals who presented to the study center emergency department (ED) with assaultive firearm injury during the 2-year study period from January 10, 2020 to January 10, 2022 were included in a retrospective review of the EMR and YNH HVIP records. The retrospective review of the EMR and YNH HVIP records was deemed low risk by the Yale University institutional review board and the requirement for consent for this component of the study was waived.

#### Measurements and outcomes

All variables in the analysis including demographic characteristics, YNH HVIP enrollment status, and reinjury outcomes were extracted from the EMR and YNH HVIP program data. Demographic characteristics included age, sex, race, ethnicity, and primary language. Other variables included prior firearm injury, history of substance use, history of mental illness, history of traumatic brain injury (TBI), housing status, and admission status. Prior firearm injury was defined as a previous encounter for firearm injury or firearm injury documented in the medical history at index admission. History of substance use was defined as current substance use as documented in the index admission social history or provider notes, or documented substance use disorder in the medical history at index admission. History of mental illness was defined as having a diagnosis found in Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (e.g., mood disorder, psychotic disorder, anxiety disorder, personality disorder, or substance use disorder) documented in the medical history at index admission. TBI was defined as TBI documented in the medical history at index admission or acquired TBI on index admission. Individuals were identified as unhoused per social work notes. Admission status was classified as ED discharged if the patient was discharged directly from the ED or admitted if the patient was admitted to the hospital. Violent reinjury was defined as ED visit or hospitalization after the index injury for firearm injury, stabbing or physical assault documented in the EMR (admissions at outside health systems may have been not identified). For those enrolled in the YNH HVIP, process outcomes of services provided were extracted from the YNH HVIP records. Process outcomes included

completion of the Victim of Crime Act (VOCA) Victim Compensation Program application, unconditional cash transfer defined as a one-time cash disbursement of $300–$900, referral to a mental health provider, housing/rental assistance defined as assistance searching for or applying for housing or rental assistance, employment/income assistance defined as assistance searching for or applying for employment or public benefits, and referral to community organizations for additional case management.

### Data analysis

Categorical variables are presented as a proportion and a number. Continuous variables are presented as a mean with SD or median with IQR as appropriate. The data are stratified by YNH HVIP enrollment status. The $\chi^2$ test was used to test for statistically significant differences between the two groups (alpha=0.05) for categorical variables and the Student's t-test or Wilcoxon rank-sum test were used for continuous variables as appropriate. Univariate logistic regression was used to test for unadjusted associations between baseline characteristics and YNH HVIP enrollment. A multivariate logistic regression model was created to evaluate for associations between baseline characteristics and enrollment status. Age, sex, race and ethnicity were selected a priori as predictor variables for inclusion in the model. Candidate variables for which $p<0.1$ were included as predictors in the model. For individuals enrolled in the YNH HVIP, we presented descriptive statistics on the provision of different services.

## Qualitative evaluation

### Participants and sampling strategy

Eligible participants were adults who had experienced assaultive firearm injury during the study period, were enrolled in the YNH HVIP (defined as having completed consent for YNH HVIP enrollment and having attended one or more case management sessions with YNH HVIP program administrators) and were English-speaking. A convenience sampling strategy was utilized for YNH HVIP participants, in which individuals enrolled in the HVIP with active contact information were contacted for invitation to participate in the present study. We conducted interviews with all YNH HVIP program administrators and personnel. Verbal informed consent was obtained and documented by the interviewer and a $40 gift card was provided to participants.

### Data collection

Semistructured interviews of YNH HVIP participants were conducted via telephone by CSS, a medical student trained in qualitative interviewing. Semistructured interviews of YNH HVIP program administrators were conducted by KMO, a surgical resident and PhD graduate with extensive experience in qualitative research. The interview guide was developed by KMO with open-ended questions designed to elicit participants' perceptions and experiences with the YNH HVIP, informed by the elements of RE-AIM (online supplemental table 1). All interviews were audio-recorded and were transcribed verbatim by CSS.

### Data analysis

KMO and CSS independently reviewed the first five interviews of YNH HVIP participants and two interviews of YNH HVIP program administrators and assigned descriptive codes using directed content analysis to generate and categorize codes according to the RE-AIM dimensions.[20] KMO and CSS met to organize codes and identify themes from the emerging data. Discrepancies in coding were discussed until consensus was achieved. CSS then applied the final code structure to the remaining five interviews of YNH HVIP participants. Data management was performed using Dedoose qualitative data analysis software.[21]

**Table 1** Study population characteristics

| | Total | Enrolled | Not enrolled | P value |
|---|---|---|---|---|
| N | 319 | 39 | 280 | n/a |
| Age | 29 (11) | 29 (7) | 29 (11) | 0.94 |
| Male sex | 87% (277) | 87% (34) | 87% (243) | 0.95 |
| Race | | | | |
| White | 8% (27) | 3% (1) | 9% (26) | 0.07 |
| Black | 78% (249) | 92% (36) | 76% (213) | |
| Other | 13% (43) | 5% (2) | 15% (41) | |
| Ethnicity | | | | |
| Non-Hispanic | 82% (263) | 92% (36) | 81% (227) | 0.08 |
| Hispanic | 18% (56) | 8% (3) | 19% (53) | |
| English as primary language | 97% (308) | 100% (39) | 96% (269) | 0.21 |
| Prior firearm injury | 9% (28) | 13% (5) | 8% (23) | 0.34 |
| History of substance use | 48% (154) | 46% (18) | 49% (136) | 0.78 |
| History of mental illness | 35% (112) | 38% (15) | 35% (97) | 0.66 |
| Traumatic brain injury | 6% (18) | 10% (4) | 5% (14) | 0.18 |
| Unhoused | 5% (17) | 3% (1) | 6% (16) | 0.41 |
| Admission status | | | | 0.01 |
| Inpatient admission | 47% (150) | 67% (26) | 44% (124) | |
| ED discharged | 53% (169) | 33% (13) | 56% (156) | |
| Violent reinjury | 7% (22) | 5% (2) | 7% (20) | 0.64 |

Continuous data are presented as a mean with SD; categorical variables are presented as a percentage and number (N). P values are from Student's t-test for continuous variables and $\chi^2$ test for categorical variables. All definitions of variables can be found in the article.
ED, emergency department.

## Clinician survey

### Participants

We conducted an online clinician survey assessing awareness of YNH HVIP services. The survey was distributed via email to the Department of Surgery and Department of Emergency Medicine. Residents, fellows, attendings, advanced practice providers, nurses, social workers, and other treating clinicians were eligible to participate.

### Outcomes and data analysis

Survey questions are presented in online supplemental table 2. Participants were asked for their department and role. Descriptive statistics of participant responses were presented.

# RESULTS

## Reach

During the 2-year study period, 355 patients presented with assaultive firearm injury, of which 36 (10%) died from their injuries. Therefore, 319 individuals were considered for enrollment. The mean age was 29±11 years, 87% of individuals were male, and 78% identified as black. Of the final cohort, 18% identified as Hispanic. Complete sample characteristics overall, stratified by enrollment status, are presented in table 1. Of the 319 individuals considered for enrollment, 39 (12%) individuals were ultimately enrolled in the YNH HVIP. Reasons for non-enrollment included being lost to follow-up (n=169, 60%), declining services (n=35, 13%), severe mental illness or substance use

Table 2 Unadjusted associations between baseline characteristics and YNH HVIP enrollment

| | Unadjusted OR (95% CI) | P value |
|---|---|---|
| Age | 1.0 (0.97 to 1.0) | 0.94 |
| Female sex | 0.97 (0.36 to 2.6) | 0.95 |
| Race | | |
| Black | 4.4 (0.58 to 33) | 0.15 |
| Other | 1.3 (0.11 to 15) | 0.85 |
| Ethnicity | | |
| Hispanic | 0.36 (0.11 to 1.2) | 0.1 |
| English as primary language | n/a | n/a |
| Prior firearm injury | 1.6 (0.59 to 4.6) | 0.35 |
| History of substance use | 0.91 (0.46 to 1.8) | 0.78 |
| History of mental illness | 1.17 (0.58 to 2.3) | 0.66 |
| Traumatic brain injury | 2.17 (0.68 to 7.0) | 0.19 |
| Unhoused | 0.43 (0.06 to 3.4) | 0.43 |
| Admission status | | 0.01 |
| Inpatient admission | 2.5 (1.2 to 5.1) | |

OR and P values are from univariate logistic regression. ORs are presented as a number and the 95% CI. All variable definitions can be found in the article.
HVIP, hospital-based violence intervention program.

disorder (n=19, 7%), living outside the catchment area (n=4, 1%), or other reason (n=6, 2%). Reason for non-enrollment was not documented for 47 individuals (17%). Unadjusted associations of baseline characteristics with enrollment are presented in table 2. Inpatient admission was associated with YNH HVIP enrollment (unadjusted OR 2.5, 95% CI 1.2 to 5.1; p=0.01).

The final logistic regression model of YNH HVIP enrollment included age, sex, race, ethnicity and admission status as predictor variables. Inpatient admission (OR 2.6, 95% CI 1.3 to 5.2; p=0.01) was independently associated with YNH HVIP enrollment even after adjusting for other factors. Age (OR 1.0, 95% CI 0.97 to 1.0; p=0.87), female sex (OR 1.1, 95% CI 0.38 to 3.0; p=0.89), black race (OR 4.6, 95% CI 0.5 to 42; p=0.18), other race (OR 1.3, 95% CI 0.11 to 16; p=0.84), and Hispanic ethnicity (OR 0.98, 95% CI 0.18 to 5.3; p=0.99) were not associated with enrollment.

Ten YNH HVIP clients and two program administrators completed semistructured qualitative interviews. Of the clients who participated in interviews, the mean age was 31±5 years, 90%[9] were male, all identified as non-Hispanic black, and 40%[4] had an inpatient admission due to their injury. Characteristics of the program administrators who participated were censored to maintain privacy. Key themes identified are presented in table 3 along with representative quotations.

Three themes emerged that were categorized as facilitators of *Reach*: (1) Credible messenger: Participants highlighted the importance of engaging with credible messengers among the YNH HVIP program staff that had shared lived experiences and rich knowledge; (2) Personal relationship: Several participants stated that having a personal relationship with YNH HVIP program administrators motivated them to enroll in the YNH HVIP; (3) Family encouragement: Encouragement from family members prompted some participants to enroll in the YNH HVIP.

Three themes emerged that were categorized as barriers to *Reach*: (1) Being perceived as a snitch: Participants described having reservations about joining the YNH HVIP due to concern they would be 'labeled as a snitch'. This was closely related to the theme of (2) Fear of disclosure to police: There was a prevalent concern that the YNH HVIP had a partnership with the police and that information provided to the YNH HVIP would be disclosed to police. (3) Difficulty with contact: Administrators described challenges in contacting potential participants as a barrier to *Reach*, especially after discharge. Common challenges included incorrect or out-of-service phone numbers.

## Effectiveness

Among enrolled individuals, 2 (5%) sustained violent reinjuries compared with 20 (7%) among those not enrolled in the YNH HVIP. YNH HVIP enrollment was not associated with reduced incidence of violent reinjury (OR 0.70, 95% CI 0.16 to 3.1).

Qualitative themes related to the *Effectiveness* dimension were categorized as Met needs or Unmet needs. Three themes made up the category of Met needs: (1) Sense of support: Many participants described that they felt supported by the YNH HVIP program, which was important after the destabilizing event of experiencing firearm injury. This was described as especially important for individuals who did not have robust social support from family and peers. (2) Financial support: Participants described how unconditional cash transfer addressed urgent basic financial needs such as purchasing clothes for children. (3) Mental health support: Brief counseling by the YNH HVIP licensed clinical social worker and other mental health providers provided coping strategies for symptoms of post-traumatic stress.

Two themes made up the category of Unmet needs. (1) Housing: Participants who were unhoused or unstably housed described significant challenges in identifying pathways to stable housing, and inadequate support in this domain. (2) Untreated post-traumatic stress symptoms: Several participants reported significant untreated or inadequately managed symptoms of post-traumatic stress.

## Adoption

Respondents to the clinician survey assessing awareness of YNH HVIP services were composed of 54% surgery residents, 22% surgery attendings, 17% emergency medicine residents, and 6% other clinicians. Of the respondents, 38% reported being aware of YNH HVIP services, and 24% reported either discussing the YNH HVIP services with a patient or making a referral to YNH HVIP. Key barriers were not being aware of YNH HVIP services (52%), not having enough information about YNH HVIP services (37%), and perception that another team member was responsible for making referrals (13%). Complete data are presented in table 4.

## Implementation

The proportions of enrolled participants who received specific YNH HVIP services are presented in table 5. A Victim of Crime Act Compensation Program application was completed for 92% of enrolled participants. Of those enrolled in the YNH HVIP, 18% received unconditional cash transfer between $300 and $900 to address urgent financial needs, 15% received a referral to a mental health provider and the Connecticut Violence Intervention Program, 13% received employment or income assistance and 5% received housing or rental assistance.

Themes related to the *Implementation* dimension were categorized as Strengths or Areas for improvement. The two themes that made up Strengths in *Implementation* were as follows: (1) Client relationships: Participants acknowledged the significant commitment that program administrators made to YNH HVIP participants and identified this as a strength

**Table 3** Themes identified from qualitative interviews

| RE-AIM dimension | Theme | Representative quotations |
|---|---|---|
| Reach | **Facilitators** | |
| | Credible messenger | **Participant 7**: "Your colleague pulled up in the neighborhood, or should I say, in the hood, boldly, got out his car and sat with me on the porch. He didn't pull out no paperwork, none of that. He just asked me who I was and we talked." |
| | Personal relationship | **Participant 5**: "I was very familiar with a few people that's in the program, that run the program … I know their character, they're some good guys." |
| | Family encouragement | **Participant 8**: "My mother was telling me I should try it, it was something I should do. So that's why I did it." |
| | **Barriers** | |
| | Being perceived as a snitch | **Participant 2**: "I had hesitations because of other people trying to drill in my head that I'd be labeled as a snitch." |
| | Fear of disclosure to police | **Participant 7:** "you get shot, you don't want to talk to police, you don't know who to talk to because you don't know who did it, you think everyone's got their own motive to know what's going on." |
| | Difficulty with contact | **Administrator 1:** "Like if they've been discharged, then I've already missed them." |
| Effectiveness | **Met needs** | |
| | Sense of support | **Participant 6**: "I felt good about it because it's somebody who's trying to help me, and it's crazy that I had to go through what I had to go through to be able to get the service or whatever but I felt that he was really here for me." |
| | Financial support | **Participant 7**: "So (unconditional cash transfer) helps me get (my children) like I've been helping them like get them some shoes this weekend, and clothes." |
| | Mental health support | **Participant 1**: "We talked about my fears and to help me get counseling for PTSD. Stuff like that." |
| | **Unmet needs** | |
| | Housing | **Participant 5**: "I was trying to get some type of housing … (but) I'm still staying with somebody that – I'm actually living with my girlfriend, her mom." |
| | Untreated PTS symptoms | **Participant 9**: "Yeah, I'm on edge. I'm alert 24/7. My sleep isn't sleep, you know what I'm saying?" |
| Implementation | **Strengths** | |
| | Client relationships | **Participant 2**: "He was definitely there for me at the time. He called and checked up on me. That's the thing that I liked. He didn't just do it for his salary or whatever. You know?" |
| | Empathy | **Participant 7:** "And I love the way you guys' approach is. Keep the same gentle approach. Because I love the fact you guys are sensitive to your clients' needs." |
| | **Areas for Improvement** | |
| | Program intensity | **Participant 1:** "Like instead of counseling once a week, you could do other stuff… Just more hands-on programs and outreach, you know?" |
| | Initiating contact | **Participant 4:** "Maybe reach out a little more. Reach out a little more to the victims, or people, etc." |
| | Group sessions | **Participant 10**: "Like a group of people that've been through the same thing I've been through (could improve the program)." |
| Maintenance | Need for services | **Participant 2:** "Yes (HVIP services are necessary) because you're a victim of someone – like I was just out on the street. Especially if you had a job, like if you were working, and you're the provider for your family, definitely. They're just going to be willing to help you." |

Themes identified from qualitative interviews are presented along with representative quotations. Themes are organized according to the dimensions of the RE-AIM framework.

**Table 4** Clinician survey assessing awareness of HVIP services

| | % (n) |
|---|---|
| Total | 100% (63) |
| Position | |
| Surgery resident | 54% (34) |
| Surgery attending | 22% (14) |
| Emergency medicine resident | 17% (11) |
| Other | 6% (4) |
| Cared for patient with violent injury | 92% (58) |
| Aware of HVIP | 38% (24) |
| Discussed or referred patient to HVIP | 24% (15) |
| Barriers to discussing HVIP | |
| Not aware of HVIP | 52% (33) |
| Not enough information about HVIP | 37% (23) |
| Other's responsibility | 13% (8) |
| HVIP services are appropriate resources for patient with violent injury | 73% (46) |

Data are presented as percentage and number (N).
HVIP, hospital-based violence intervention program.

of the program. (2) Empathy: Compassionate communication were also highlighted as important characteristics of program administrators.

Three themes made up the category of Areas for improvement. (1) Program intensity: Participants expressed a desire for greater program intensity, consisting of both a greater number of touch points between participants and program administrators, and a

**Table 5** Client services delivered

| | % (n) |
|---|---|
| Total | *100% (39)* |
| VOCA application | 92% (36) |
| Unconditional cash transfer | 18% (7) |
| Mental health referral | 15% (6) |
| Housing/rental assistance | 5% (2) |
| Employment/income assistance | 13% (5) |
| Referral to community organization | 15% (6) |

Data are presented as percentage and number (N).
VOCA, Victim of Crime Act.

broader range of YNH HVIP services and referrals. (2) Initiating contact: Participants described the direction of contact between participants and program administrators. Specifically, program administrators should contact participants, or as one participant stated, "reach out a little more." (3) Group sessions: One participant recommended that group sessions fostering peer-to-peer relationships would be beneficial.

### Maintenance

Of the clinician survey respondents, 73% reported that YNH HVIP services are appropriate resources for individuals who experience violent injury. Qualitative interview participants also reported a need for YNH HVIP services among individuals who experience violent injury.

## DISCUSSION

We conducted a multimethod evaluation of the first 2 years of implementation of a HVIP and reported findings according to the RE-AIM framework. Facilitators of *Reach* included engaging with credible messengers, personal relationships with YNH HVIP program administrators, and encouragement from family to enroll; conversely, barriers to *Reach* included fear of being perceived as a snitch or disclosure of personal information to police, as well as difficulty with telephone contact. The overall YNH HVIP enrollment rate was 12%. Inpatient admission was independently associated with YNH HVIP enrollment. In terms of *Effectiveness,* the program has not yet demonstrated a statistically significant impact on violent reinjury. Participants reported needs that were successfully met including social, financial, and mental health support. Needs that were inadequately addressed included establishing stable housing and untreated symptoms of post-traumatic stress. Limited awareness of YNH HVIP services was a barrier to *Adoption*, with only 38% of clinician survey respondents reporting they were aware of YNH HVIP services. Participants described strengths of *Implementation* that centered the program administrators, highlighting the deep relationships built with clients and empathy. Almost all participants completed a VOCA application but only a small percentage received unconditional cash transfers or referrals to meet identified needs such as mental health and housing. Participants highlighted increased program intensity, receipt of more frequent contact and group sessions as areas of program implementation that could be improved. For the long-term *Maintenance* of the program, both clinicians and YNH HVIP clients reported that there is a need for HVIP services for individuals who experience violent injury.

In the *Reach* dimension, we report a low overall enrollment rate. Enrollment rate varies widely in previously published reports, and a target enrollment rate has not been established. For example, the San Francisco General Hospital Wraparound program reported an enrollment rate of 14%,[11] whereas the Boston Violence Intervention Advocacy Program reported an enrollment rate of 37%.[22] Comparison of enrollment between programs is made difficult because of variable definitions of eligibility criteria. We posit that our low enrollment rate may in part have been influenced by effects of the COVID-19 pandemic, which prevented in-person client engagement for 4 months and limited it for the duration of the study period, and may have contributed to additional disruption of service provision not adequately accounted for here. Utilizing virtual communication was hindered by challenges in establishing telephone contact. The association between inpatient admission and enrollment is likely multifactorial. These patients may have greater needs as a consequence of more severe injury (eg, financial need secondary to prolonged absence from work during rehabilitation). Also, our YNH HVIP program administrators were more likely to make initial in-person contact with individuals who were admitted, which likely contributes to this association.

Our qualitative findings highlight the importance of engaging credible messengers that can quickly develop trust with violently injured patients, stemming from shared lived experience and deep knowledge of the communities in which they work. This adds to a growing body of evidence demonstrating the importance of this shared lived experience.[23–25] We report a novel finding that family engagement informed participants' decision to enroll, and additional work is needed to evaluate how family and peers may be optimally engaged to promote HVIP enrollment. Fear of being perceived as a snitch and disclosure of personal information to police were important barriers to *Reach*. Individuals with assaultive firearm injury often personally have had negative experiences with police prior to and while receiving treatment for their injury.[26] The distinction between medical providers and police is complicated by the frequent presence of police in the ED.[27] This highlights the importance of clearly communicating that HVIPs operate separately from police with the goal of exclusively serving client needs. YNH HVIP program administrators described challenges in establishing phone contact with potential clients, often due to incorrect or frequently changing contact information and service interruptions, leading to many potential clients being lost to follow-up. Novel strategies for facilitating virtual communication in this population should be explored. Leveraging the experiences of credible messengers and engaging family and peers represent modifiable factors that promote *Reach*.

In the *Effectiveness* dimension, participants reported satisfaction with a number of YNH HVIP services. Unconditional cash transfer was described as important in addressing urgent financial needs that emerged after injury. Future work should explore the role of unconditional cash transfer in supporting individuals with assaultive firearm injury. Experiences with mental health services were mixed, with some participants reporting satisfaction with services and others reporting persistent or untreated symptoms. Consistent with previous studies, addressing needs related to housing is challenging[11 22] and robust services are needed to address this intersection between violence and housing instability.

In the *Adoption* dimension, we report low clinician awareness of YNH HVIP services, resulted in few clinicians discussing YNH HVIP services with patients. Additional efforts to provide education to treating clinicians about HVIP services will likely be beneficial.

In the *Implementation* dimension, clients reported a desire for increased program intensity, both in the type of services offered and number of touch points with the YNH HVIP. Low program intensity has been implicated as a limitation in previous studies of HVIPs.[17] Participants noted the importance of YNH HVIP program administrators initiating contact with them to create the sense of support that is foundational to the program. The optimal interval of contact likely varies greatly between participants and should likely be discussed in the initial visit to create shared expectations with participants.

Due to the short study period, we were not able to assess long-term outcomes of YNH HVIP enrollment, a key component of the *Maintenance* dimension. However, promisingly, we found that both clinicians and YNH HVIP clients reported that there is

a need for HVIP services for individuals with violent injury. This stakeholder buy-in is a key facilitator of program *Maintenance*. Additional research examining long-term outcomes of HVIP clients is needed. Additionally, funding strategies and organizational practices that promote program sustainability should be elucidated.

There are several important limitations of this study. We were unable to report on the proportion of participant needs that were successfully met due to limitations in YNH HVIP documentation. Due to small sample size and short-term follow-up, the power to detect differences in reinjury outcomes is limited. The use of a convenience sampling strategy may affect the external validity of the results. Additionally, we identified reinjury from the EMR of the only hospital in the study area. Therefore, reinjury may be underestimated if reinjury events occurred outside of the study area.

## CONCLUSION

We identified key facilitators and barriers to recruitment, effectiveness, adoption, implementation, and maintenance using the RE-AIM framework adapted to an emerging HVIP. This study may serve as a model for program evaluation to further standardize HVIP implementation. This standardization will allow for better critical evaluation of the efficacy of HVIPs and ultimately help guide the development, implementation, and uptake of these initiatives around the country.

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