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Hospital-centered violence intervention programs: a cost-effectiveness analysis

Vincent E. Chong, M.D., M.S.[a], Randi Smith, M.D., M.P.H.[a], Arturo Garcia, M.D.[a], Wayne S. Lee, M.D.[a], Linnea Ashley, M.P.H.[b], Anne Marks, M.P.P.[b], Terrence H. Liu, M.D., M.P.H.[a], Gregory P. Victorino, M.D.[a],*

[a]Department of Surgery, Highland Hospital, University of California, San Francisco–East Bay, 1411 East 31st Street, QIC 22134, [b]Youth ALIVE!, 3300 Elm Street, Oakland, CA, USA

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Violence prevention;
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Abstract

BACKGROUND: Hospital-centered violence intervention programs (HVIPs) reduce violent injury recidivism. However, dedicated cost analyses of such programs have not yet been published. We hypothesized that the HVIP at our urban trauma center is a cost-effective means for reducing violent injury recidivism.

METHODS: We conducted a cost-utility analysis using a state-transition (Markov) decision model, comparing participation in our HVIP with standard risk reduction for patients injured because of firearm violence. Model inputs were derived from our trauma registry and published literature.

RESULTS: The 1-year recidivism rate for participants in our HVIP was 2.5%, compared with 4% for those receiving standard risk reduction resources. Total per-person costs of each violence prevention arm were similar: $3,574 for our HVIP and $3,515 for standard referrals. The incremental cost effectiveness ratio for our HVIP was $2,941.

CONCLUSION: Our HVIP is a cost-effective means of preventing recurrent episodes of violent injury in patients hurt by firearms.
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First discussed in the surgical literature 3 decades ago, injury recidivism because of interpersonal violence is an ongoing problem for our nation's urban trauma centers and the communities they serve.[1–3] In response to this major public health issue, trauma centers and community organizations have collaborated to develop hospital-centered tertiary violence prevention programs aimed at reducing the incidence and burden of recurrent violent injury.[4] Evaluations of these violence intervention programs demonstrate that they are effective in reducing both violent injury recidivism[5] and criminal justice recidivism.[6] Accordingly, the widespread success of these programs has led to the development of the National Network of Hospital-Based Violence Intervention Programs,[7] the aim of which is to promote best practices, create evidence-based research, and affect policy change.

Although most evaluations on hospital-centered violence intervention programs (HVIP) have concentrated on clinical outcomes, there is also a need to include costs into program assessment. This will allow for a better

* Corresponding author. Tel.: +1-510-437-8370; fax: +1-510-437-5127.

E-mail address: gvictorino@alamedahealthsystem.org

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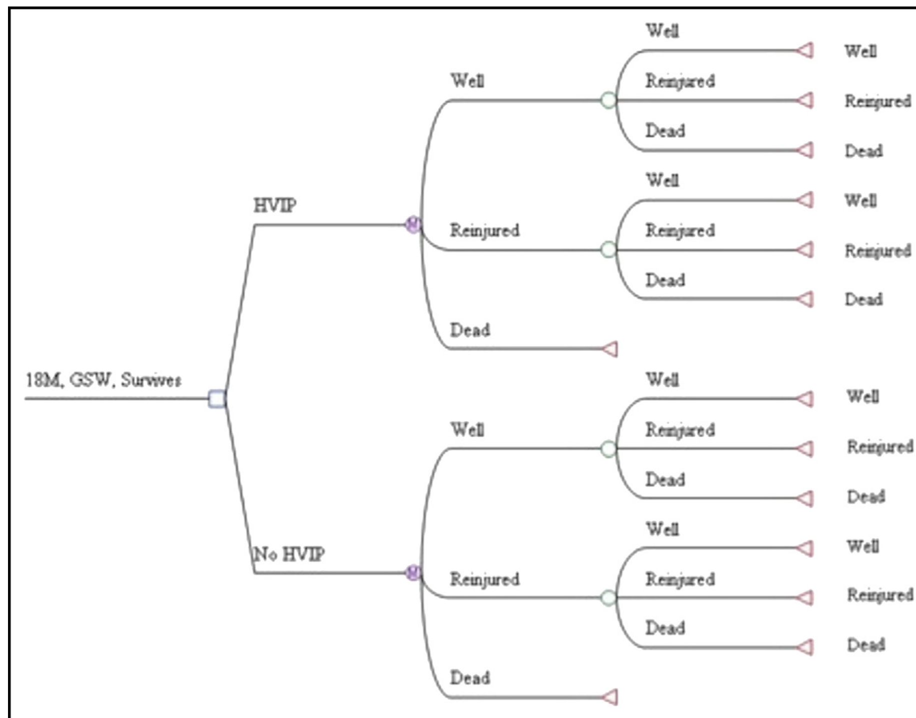

Figure 1 The first branch in our tree is a decision node leading to either participation in our HVIP or receipt of standard risk reduction services (no HVIP). Patients in each arm then enter a Markovian state-transition model, in which they cycle through 3 different health states yearly: well, reinjured, and dead. 18M, GSW = 18-year-old patient with a gunshot wound.

understanding of the value of such programs in comparison with standard risk reduction strategies utilized in trauma centers and emergency departments. Early evidence on the cost savings of hospital-based violence intervention programs has been indirect, but promising.[8] For example, an evaluation of the hospital-based violence intervention program at the R Adams Cowley Shock Trauma Center in Baltimore, MD, demonstrated a recidivism rate for program participants of 5% compared with 36% for a control group that did not receive any violence intervention services.[5] This corresponded to a cost difference of $598,000 between groups in regards to their recidivism hospitalization costs. Similarly, a non-peer reviewed analysis of 32 participants from Project Ujima in Milwaukee, WI, found that violence intervention program to be a cost-effective program at a willingness-to-pay threshold of $1,466.[7] Moreover, by reducing subsequent involvement of program participants in the criminal justice system, hospital-based violence intervention programs have also produced cost savings from a societal perspective in the estimated range of $750,000 to $1 million annually.[5,6]

To build on the efforts of previous evaluations, the aim of this article is to conduct a dedicated cost analysis of our trauma center's HVIP using standard cost-effectiveness methods.[9] This study compares participation in such a program with receipt of standard risk reduction resources for patients injured by firearm violence, and we hypothesized that our violence intervention program is a cost-effective means of reducing recurrent violent injury.

Patients and Methods

Study design

This is a cost-effectiveness analysis from a healthcare perspective. A state-transition Markov decision tree was constructed using decision software (TreeAge Pro Healthcare Module 2011; TreeAge Software, Inc, Williamstown, MA) to model the probability of recurrent violent injury with or without violence intervention services (Fig. 1). Our model compared 2 violence prevention strategies available to our patients after discharge: (1) participation in an HVIP consisting of intensive case management services or (2) receipt of standard counseling and referrals from emergency department and trauma social workers with no scheduled or routine follow-up. Patients in each treatment arm are then cycled through one of 3 health states: well (meaning no episodes of violent reinjury), recurrent violent injury, and death.

Interventions

Since 1994, our hospital (Highland Hospital) in Oakland, CA, has collaborated with Youth ALIVE!, a community organization dedicated to violence prevention and youth leadership development, to provide services to victims of interpersonal violence seen at our trauma center. This violence intervention program, called Caught in the

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