Current Trauma Reports (2021) 7:92–102
https://doi.org/10.1007/s40719-021-00218-w

INTENTIONAL VIOLENCE (S BONNE AND M CRANDALL, SECTION EDITORS)

Intimate Partner Homicide: Current Understandings of Identifying Risk and Providing Patient Empowerment

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Accepted: 16 August 2021 / Published online: 23 November 2021

Abstract

Purpose of Review Intimate partner homicide (IPH), the lethal consequence of intimate partner violence (IPV), continues to account for a significant proportion of homicides worldwide. This review will highlight known risk factors of IPH, the state of risk assessment in healthcare settings, and examples of public policies that have impacted IPH risk.

Recent Findings Studies have identified risk factors unique to IPH, which include female and transgender identities, a larger age gap between victim and perpetrator, race and ethnic minority identities, IPV during pregnancy, migration to the USA, socioeconomic instability, and a previous history of IPV. There are a variety of risk assessment tools used in healthcare settings, each developed within specific contexts of providers, participants, and settings. Finally, policies restricting firearm access to previous perpetrators of IPV has been associated with decreased rates in IPH.

Summary While there are discrete risk factors and vulnerabilities for IPH, further work is needed to better understand risk within historically marginalized communities. The variation in risk assessment tools suggests that the administrator should select the one that best meets the patient's specific situation. Finally, the association between firearm control and IPH rates is an encouraging example for future directions of impacting IPH. While there are still challenges to identifying and intervening on IPH, there are promising opportunities to innovate new methods of providing safety and empowerment.

Keywords Intimate partner homicide · Intimate partner violence · Femicide · Domestic violence · Spouse abuse · Homicide

Introduction

Intimate partner violence (IPV) is defined by the CDC as "physical, emotional, or psychological harm in the form of physical or sexual violence, stalking, and/or psychological aggression (including coercive acts), which may be perpetuated by a current or former partner" [1]. It is currently estimated that 22.3% of women and 14.0% of men have experienced physical violence from an intimate partner within their lifetime, with cumulative risk for IPV estimated as high as 54% for women [2, 3]. This form of violence is also believed to be the leading cause of serious injury in women between the ages of 15 and 44 years old and the second-leading cause of death in the same age group [4]. The lethal consequence of IPV is known as intimate partner homicide (IPH). In a systematic review of homicide-related data from 66 countries, it was estimated that 13.5% of homicides were committed by an intimate partner, accounting for 38.6% of total homicides for female victims and 6.3% among men [5]. Further, a survey of the National Violent Death Reporting System (NVDRS) across 16 states from 2003 to 2009 found that 20% of victims in IPH cases were corollary victims, which includes family, friends, other intimate partners, police officers, and others involved in the incident [6]. These devastating consequences of IPH have motivated concerted research efforts into identifying associated risk factors, which include female and transgender identities, a larger age gap between victim and perpetrator, race and ethnic minority identities, IPV during pregnancy, migration to the USA, socioeconomic instability, and a previous history of IPV. Other research has focused on assessing an individual's

This article is part of the Topical collection on *Intentional Violence*

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risk and innovating ways to provide safety and empowerment to intervene before a perpetrator can act. Yet there also remain many unknowns in risk assessment across diverse settings, as well as challenges for vulnerable individuals to access sources of support. To address these problems, this review will summarize known risk factors of IPH, how risk is assessed in healthcare settings, and examples of public policies that have influenced IPH risk.

Risk Factors Associated with IPH

Gender

Both national and global estimates indicate that the majority of IPH victims were identified as female [5–8]. Importantly, an analysis of state-level homicide data from across the country from 2000 to 2017 found a significant association between gender inequity and rates of IPH [9]. Less is known about IPH across populations that identify as transgender or gender non-binary. A systematic review of 74 unique datasets involving 49,966 transgender subjects found a lifetime prevalence of physical IPV of 37.5% and sexual IPV of 25.0%, as well as a 1.7 times increased risk for any form of IPV compared to cisgender subjects [10]. There was no statistically significant difference in the rates of IPV between gender binary and gender non-binary subjects [10]. With regard to sexual orientation and the gender of victim and perpetrator, a review of 51,007 cases of IPH showed that the rate of IPH was found to be higher in gay relative to heterosexual and lesbian couples [11]. Additional factors that were associated with an increased risk for IPV included family assault, family harassment, general victimization, repeated gender-related victimization, and everyday victimization [10].

Age

In the same 16-state NVDRS report conducted from 2003 to 2009, the mean age of IPH victims was 38.5 years, with a range of 11–90 years old [6]. Using the Chicago Homicide Dataset, which includes all homicides in Chicago from 1965 to 1996, the risk of intimate partner homicide is considerably elevated for couples with a large discrepancy between their ages, where the man is at least 16 years older than the woman or the woman is at least 10 years older than the man [12]. This risk pattern occurs regardless of whether the man or the woman was the homicide offender and does not depend on the previous arrest record of the offender [12]. Identifying cases of IPH in the geriatric population may pose unique challenges; forms of IPH, such as death from intimate partner caregiver neglect, may not be as easily detected as compared to lethal physical violence [13]. A review of the National Incident-Based Reporting System (NIBRS) and the FBI Supplementary Homicide Report from 2000 to 2005 showed that elderly victims of homicide were more likely male (57.6–60.1%); however, female victims were more likely to be killed by a spouse, family member, or other family member (70.2% versus 42.9%) [14]. Studies have also indicated that the incidence of IPH decreases with age beyond 65 years or older [14]. More prevalent risk factors for IPH in this population include health impairment and social isolation, whereas divorce and a previous history of IPV are less common as compared to younger victims [13, 15].

Race and Ethnicity

Multiple studies of IPH cases have shown that lethal intimate violence disproportionately impacts females of minority racial and ethnic identities. Geary et al. found that in North Carolina Violent Death Reporting System (VDRS) data from 2011 to 2015, IPH victimization rates were highest among females, and those among Black and American Indian victims were higher compared to non-Hispanic White victims (1.8 and 2.0 times greater, respectively) [16]. Another study of North Carolina VDRS data from 2010 to 2017 by Kafka et al. indicated that Black victims were the most frequent corollary victim of IPH [17]. Data from the Illinois VDRS from 2005 to 2010 found that 60.4% of victims were female, while 61.8% of all victims were Black, 14.9% Hispanic, and 20.7% White [7]. Azziz-Baumgartner et al. concluded in their study of IPH cases in Massachusetts from 1993 to 2007 that femicide rates disproportionately affected Black and Hispanic women (16.2 and 15.4 cases per 1,000,000 years, respectively, compared to 4.7 cases per 1,000,000 years for those identifying as White) [18].

National data reflects this heightened risk of IPH victimization in the intersection of female gender and minority racial or ethnic identity; in a study of IPH cases across 11 cities, 44.8% of female victims were Black, 27.7% were White, and 21.9% were Hispanic. Petrosky et al. showed that within NVDRS data from 2004 to 2014, for all homicide cases with a female victim, the greatest rate of IPH was among Hispanic women (61%) [19]. Further, a review of data from the NVDRS from 2000 to 2005 showed that 85.7% of IPH cases in which the victim identified as Asian were females [20]. Among pregnancy-associated IPH victimization in the NVDRS from 2003 to 2007, the highest rate of IPH per live births was for victims identifying as Black. The relationship between previous IPV risk and subsequent IPH may also vary across identity; in a meta-analysis of IPV and IPH literature, compared to IPV victims, female IPH victims were more likely to be Black [21]. In a multicenter case-control study comparing female victims of non-fatal IPV to victims of IPH, 20.6% of non-lethal IPV victims were

identified as Black compared to 47.3% for IPH victims [22]. These alarming findings underscore the need for outreach and empowerment that dignifies the needs of individuals in the context of how social, historical, and economic forms of oppression have elevated IPH risk based on gender and racial or ethnic identity.

Pregnancy

IPH is one of the leading causes of homicides among pregnant victims. Palladino et al. found that the rate of pregnancy-related homicides in NVDRS data ranging from 2003 to 2007 was 2.9 deaths per 100,000 live births, with 45.3% of these deaths associated with previous accounts of IPV [23]. Using Maryland state data from 1993 to 2008, Cheng and Horon found that the majority of pregnancy-associated homicides were committed by current or former intimate partners, most commonly during the first 3 months of pregnancy [24]. A systematic review of global studies of homicides during pregnancy found that up to nearly 60% of these cases in the USA are associated with an intimate partner as the perpetrator [25].

Studies investigating pregnancy as a risk factor for IPH remain mixed. While Belknap et al. found pregnancy to elevate the risk for IPH victimization in Denver, Mize's and Shackelford's analysis of the Chicago Women's Health Risk Study from 1995 to 1998 showed that when controlling for other demographic variables, IPV may decrease during pregnancy and up to 1 year postpartum [8, 11]. Yet in the situations in which violence did occur, pregnancy was not found to differentiate the likelihood of lethal over non-lethal IPV [26]. On the other hand, in the multi-city case-control study of IPH victims versus those experiencing IPV, 25% of IPH victims who had been pregnant experienced abuse during pregnancy versus 7% of those experiencing solely IPV [22]. In this same study, factors that raised the risk for IPH included a recent separation or living with the partner, asking the them to leave, and a greater age gap [22]. These findings indicate that while pregnancy as a risk factor for IPH may require further study, IPV during pregnancy may heighten the risk of lethal violence. Combined with the knowledge of IPH as a major cause of pregnancy-related homicide, it is crucial for providers to assess safety during pregnancy.

Migration History

In a study of NVDRS data ranging from 2003 to 2013 from 19 states, foreign-born victims were more likely than US-born victims to be associated with IPH, and a greater proportion of female IPH victims were foreign-born [27]. Foreign-born female victims killed by their partners were more likely to be young, married, and killed by a young partner [27]. Other studies have also supported an overrepresentation of foreign-born individuals in IPH cases, and this alarming trend has motivated research into identifying risk factors unique to this population [27, 28]. Additional risks may vary on a cultural basis; a study interviewing both immigrant and refugee survivors of IPH and their practitioners found that an individual's risk of IPH is a complex interplay of a specific culture's values within the context of the relationships between the victim and the perpetrator, the community, and American societal norms [29•]. Risk factors common to multiple cultures included patriarchal norms that normalized IPV, dependence on the perpetrator due to immigration status, and racial prejudice from formal sources of help. Examples of common protective factors included extended family support, formal and information sources of help, and acculturation leading to increased awareness of formal sources of support.

Geography and Socioeconomic Stability

A review of 63 studies found rates of IPV to be similar across rural, suburban, and rural locations, with the incidence of IPH higher in rural areas [30]. Gillespie's and Reckdenwald's study of IPH data collected from 100 counties within North Carolina from 2002 to 2011 found higher rates of IPH in rural counties, along with an increased gender gap income and more limited access to domestic violence resources [31]. Importantly, in their review of NVDRS data from 2005 to 2013 across 17 states, a study by Reckdenwald et al. did not find evidence to support a relationship between victim wound severity and urbanicity [32].

An analysis of intimate partner femicide data across 59 neighborhoods in New York City from 1990 to 1999 found neighborhood per capita income to be inversely associated with IPH risk [33]. After controlling for this variable, however, there was little difference in risk across neighborhoods. A study of the North Carolina Violent Death Reporting System across 100 counties showed a significant association between county disadvantage and IPH rates in only metropolitan locales [34]. Further, a study of the Wisconsin Violent Death Reporting System from 2004 to 2008 found that after controlling for individual factors such as age, race, and marital status, neighborhood instability differentiates urban from rural cases of IPH [35]. Similarly, an extensive review of national county-wide data from the 2000s found that rates of IPH were associated with concentrated disadvantage, population density, and population stability across urban, suburban, and rural localities; however, population density was the only significant variable of these three when assessing solely rural counties [36]. These findings suggest that the socioeconomic conditions may interact with rates of IPH differently in urban versus rural communities, possibly

requiring a more nuanced approach to assessing risk in each of these locales [35].

Previous History of IPV

A 2007 review of IPH literature from the previous 10 years cited a previous history of IPV as the most common risk factor for IPH, regardless of the victim's gender [37]. When the relationship involved opposite genders, IPV against the female victim was present in as many as 67–75% of cases, regardless of which partner was killed [37]. Furthermore, female victims of IPH appear to have a more extensive history of IPV compared to male-victim cases [8]. More specific risk factors of IPH include battering, previous strangulation, a perpetrator's recent release from prison, stalking, use of or threats with weapons, serious injury in prior incidents, drug or alcohol use, forced sex of a female partner, threats to kill, and recent estrangement after a history of IPV [36–39]. A recent meta-analysis comparing non-lethal IPV to IPH went further to quantify the impact of specific forms of violence in elevating risk for lethality. As noted in their findings, "the probability of IPH increases 18.5 times when a victim is threatened with a weapon, 11.36 times with any kind of threat, 10.57 times with a death threat, 6.7 times with a previous strangulation attempt, 5.83 times in the presence of controlling behaviors, 3.74 times if the victim is abused during pregnancy, 3.14 times in cases of physical violence, and 2.79 times in the presence of stalking" [21]. These important findings demonstrate that there may be identifiable patterns of IPV that can be used to assess risk.

In regard to the victims perceived risk of lethality, of 31 interviews with female survivors of attempted IPH, the intensity of violence, other forms of abuse, and risk factor severity on the Danger Assessment tool varied greatly; approximately 51% of survivors did not view their lives as greatly in danger prior to the incident [40]. A 12-city national study of female IPH, proxy informants reported that approximately 54% of women who were killed did not believe their partner to be capable of killing them [41]. These findings indicate the severe risk posed by a previous history of IPV, regardless of the perceived risk of lethality.

Mental Health of Perpetrators

The incidence of a mental health disorder among male perpetrators has been variable across studies. Two studies of IPH cases in the United Kingdom (UK) from the early 2000s estimated the prevalence of previous mental illness among perpetrators to range from 27.5 to 32%, which was comparable to the prevalence in non-intimate homicide cases (24.6%) [41, 42]. However, among forensic psychiatry interviews of male perpetrators in IPH cases in Sweden from 1990 to 1999, approximately 95% were given at least one mental health diagnosis [43]. In a review of 234 male-perpetrated IPH cases in Quebec from 1991 to 2010, of 141 cases with sufficient documentation, 85% of perpetrators had a mental health diagnosis at the time of the homicide [44]. In these studies, the most common diagnoses were mood or personality disorders [41, 43, 45]. Furthermore, compared to perpetrators of non-lethal IPV, perpetrators of IPH have been shown to have an increased risk for mood disorders or suicidal thoughts preceding the incident [21]. On the other hand, it was shown in NVDRS data from 2003 to 2015 that a previous history of mental illness was present in only 8% of reported IPH cases [46]. The authors note, however, that 46.5% of male perpetrators attempted suicide at the time of homicide, possibly indicating a previously unseen mental illness burden [46]. In a review of IPH cases in Houston, 15% of perpetrators with fair or poor mental health had sought professional help about their mental health problem, whereas in the UK 14% of male perpetrators had been in contact with mental health services in the year preceding the incident [41, 46].

The prevalence of substance dependence among IPH perpetrators in the UK was estimated to be 1 in 10, with 80% of those cases constituting alcohol dependence. Among perpetrators with substance abuse in the Houston study, 5.4% had used alcohol treatment programs and 5.7% had used drug treatment programs [47]. In the multicenter study performed by Campbell et al., 52% of male IPH perpetrators were described as being "problem drinkers," whereas 65.4% had used illicit drugs at some point. Both of these statistics were comparatively elevated compared to perpetrators of non-lethal IPV (30.9% and 30.4% respectively) [22]. Furthermore, among 213 survivors of IPV, a significant number of those who thought their perpetrator to be capable of killing them prioritized a history of being an "alcoholic or problem drinker" with illicit drug use as a risk factor for lethal violence [48]. It is important to note that while substance use may be a risk factor, the majority of IPH cases do not appear to involve drug or alcohol intoxication at the time of the homicide [49]. In the NVDRS review from 2003 to 2015 across 27 states, if known in the case report, alcohol was present in 20.7% of IPH cases with a female victim and 41.3% of those with a male victim [46].

Homicide-Suicide

It is also important to differentiate intimate partner homicide-suicide (IPHS), in which the perpetrator commits suicide after the completed homicide. It was estimated that approximately 35% of IPH cases with a male perpetrator also included a completed suicide [46]. Reckdenwald and Simone examined 1,718 IPHS cases from the NVDRS occurring between 2003 and 2013 and found that, compared to non-intimate HS cases, the perpetrator is more likely to

be male, to be older, and Caucasian [50]. These same IPHS cases were also more likely to be carried out by firearm [50]. The most common contributing factors in older intimate partner IPHS (65+ years old) appear to be escalating intimate partner violence and caregiving/health-related issues, including caregiving strain, housing transitions, and financial problems; in younger IPHS (18–44 years) cases, there were greater rates of substance use and reported jealousy in the relationship [13]. In comparison to IPH, IPHS perpetrator risk factors include male gender, Caucasian ethnicity, a formal relationship with the victim, and access to a firearm [21].

Causality

One theory developed to explain female IPH victimization by male perpetrators is the male sexual proprietariness [51]. Male partners believe they are entitled to ownership over a female partner and may be motivated by a need to control their reproductive capacities. Violence, coercion, and other abusive behavior may be reactions to perceived threats to this control, such as in suspicion of infidelity or risk of female-initiated separation [50, 51]. Identified IPH motives that may be tied to male proprietariness include jealousy, estrangement, perceived relationship infidelity, and control [38, 52]. Along this view, a recent meta-analysis of IPH risk factors from 192 studies concluded that perpetrator-related factors include reported sexual jealousy, stalking, previous controlling behaviors, and forced sex; victim-related risk factors include separation from the abuser and if the woman has children from a different relationship [53•].

Another theory to explain IPH is the exposure reduction hypothesis, which describes IPH risk to be positively associated with the duration of exposure to a violent relationship [54]. The motivation for this theory stems from data showing previous IPV as a risk factor for IPH; male-victim IPH by female perpetrators appearing to have a higher rate of prior IPV against the perpetrator (indicating homicide as a potential means of self-defense); and macro-level associations between declining IPH rates for both genders in martial relationships and increasing rates of divorce/separation [54, 55]. However, a pooled time series analysis looking at decreasing IPH trends across 178 over the 1990s suggests that marital status, increased domestic violence resources (shelters and referral services), and female economic empowerment were statistically related to decreases in male-victim IPH but do not explain trends in female-victim IPH [54].

In regard to risk for IPV versus non-lethal IPV, a meta-analysis of nine such comparative studies found that victim risk factors that elevate IPH risk are that victims were more likely to identify as Black, have a lower educational level, and have consumed alcohol [56•]. The characteristics of IPH perpetrators that were distinguishable from IPV perpetrators were that they were more likely to identify as Black, have a lower educational level, have suicidal thoughts and/or an attempt, prior criminal records, and a history of violence in past relationships. The precipitants of the homicide distinguishable from non-lethal IPV were both the victim and perpetrator being under the influence of alcohol or drugs and the perpetrator having access to a firearm [56•]. As the authors suggested, these risk factors suggest a call for developing culturally competent screenings and training for healthcare professionals that better serve the needs of individual communities. Furthermore, there may be patterns of past behaviors and consumptions that may increase concern for lethality in an already abusive relationship.

Prior Interfaces with Healthcare Services

Of 311 cases of IPH in 11 cities, in the year before the homicide, 61% of victims had experienced IPV and 41% had utilized health agencies for physical or mental health services [47]. It has also been reported that 74% of female IPH victims and 88% of the survivors of attempted IPH had sought help at hospital EDs, hospital inpatient units, or ambulatory care settings for injuries directly from abuse [47]. In a review of homicides from 2010 to 2014 in Houston, TX, police had been in contact with the victim of intimate partner femicides for a domestic violence complaint in 91% of cases in the 3 years prior to the femicide (44.9% resulted in arrest), with an average of 6.2 visits per contacted victim [57]. Yet, less than 10% victims sought protection orders before the homicide [57]. Within the trauma patient population, a multicenter screening of trauma patients across 4 level I trauma centers from 2015 to 2016 showed that 11.4% of patients screen positive for IPV, potentially elevating the risk for IPH [58]. These findings show that there is the potential to identify at-risk individuals in a healthcare system. It is also important to recognize the presence of IPV in the healthcare worker population. A survey of 882 practicing surgeons in 2021 showed that 61% of respondents identified having been a victim of IPV, and also showed similar risk factors to the general population [59]. It is critical that those intervening to protect and empower victims of IPV and its lethal consequences also have a space to receive the same help [60].

Assessing Risk and Safety

There have been many risk assessment tools to assess risk of IPV/IPH, with several reviews comparing their reliability, validity, and applicability [60, 61, 62•]. One assessment tool used specifically to predict IPH is The Danger Assessment (DA). The DA is a 20-item questionnaire designed for healthcare and social workers to use via direct interviewing of the victim [63]. When testing across hundreds of

retrospective cases of attempted femicide versus controls from data gathered from 11 cities, the DA tool achieved an area under the curve score (AUC) of 0.90 for correctly predicting attempted femicide [64]. A second example is the Severe Intimate Violence Partner Risk Prediction Scale (SIVIPAS), a 20-item questionnaire which was developed for social workers and criminal justice personnel to aid in protected decision-making during the first charges against the perpetrator [65]. A more recent initiative is exemplified in the Arizona Intimate Partner Homicide (AzIPH) Study, in which investigators used multiple data sources across an entire state to compile IPH risk factors more specific to statewide populations [66•]. Such efforts may be able to be applied to other states, providing more locally nuanced assessments. Another promising direction is to expand the range of personnel qualified to assess IPH risk. The Lethality Screen is an 11-item questionnaire used by first responders to assess for homicide, which has allowed for onsite telephone advocacy in collaboration with domestic violence agencies [67]. Finally, the Danger Assessment for Law Enforcement is another version of the DA that has been used to identify IPV cases that pose high risk for IPH, with subsequent safety interventions [68].

However, Nicholls et al. found that there was wide heterogeneity in the data and validation methods used to develop IPV/IPH tools published from 1990 to 2011, which prevented the authors from recommending one tool above any other [61]. Messing and Thaller compared the average AUC's across 6 assessment tools, with predicting re-assault as an endpoint [69]. The highest AUC was the Ontario Domestic Assault Risk Assessment (AUC = 0.666), with the victim's own direct assessment having an AUC = 0.615. The authors also identify that one of the challenges of comparing risk assessment tools is the variety in the contexts, personnel, and the situations for which each is designed. Some tools, such as the Domestic Violence Screening Inventory (DVSI), are scored based upon criminal justice file information with intended use by criminal justice decision-makers, whereas the DA relies on a victim interview administered by trained personnel [70]. A more recent review of IPV/IPH prediction tools concluded that many validity studies have been coded by researchers rather than compiled from real-world assessments, which may also raise a need to assess the feasibility of these tools in clinical settings. One possible solution is to develop context and provider-specific guides, such as an evidence-based practice framework for choosing a relevant IPH assessment tool [71]. Future directions include assessing the validity of these tools across diverse settings that include same-sex couples and people who identify as gay, lesbian, transgender, intersex, and other identities [62•]. These studies collectively show that it is important to understand the appropriate context, personnel, and background of an assessment tool prior to use. Further, there is a need to directly compare assessment tools as they relate to predicting lethal assault.

Other challenges at assessing the risk for IPH can include identifying IPV in healthcare settings. In the trauma population, it has been shown that the most common mechanisms are blunt trauma with injuries to the face, head, and chest and penetrating injuries such as, stab wounds, and injuries caused by firearm [72]. Victims of IPV may also have privacy concerns about disclosing their abuse out of concern for inappropriate responses by healthcare professionals, discomfort with the healthcare environment, perceived barriers to disclosing domestic violence, and a lack of confidence in the outcomes of referrals [73]. While several healthcare interfaces such as EDs or ambulatory clinics have implemented paper screening tools to assess for IPV, there have been questions as to whether referrals from such screenings truly decrease IPV rates at follow-up [74]. There is also heterogeneity of how risk assessment is performed at varying institutions; a survey of 62 trauma centers in Illinois in 2013 showed that while all institutions provide universal IPV screening, there is a wide range of types of IPV screening tools and support services [75].

On the other hand, leveraging electronic services may be a promising direction to better connect and empower IPV victims. Some of these products can be used by providers, whereas app-based ones may be accessible to IPV victims themselves. These products may help identify the types of referrals best suited to a victim's specific situation. Further, app-based implementations may also address perceived barriers in healthcare settings, such as patient perceptions of provider disengagement and providers' perceived lack of time and comfort intervening in IPV [76]. One promising example of a web-based tool is an ongoing two-arm trial comparing two smartphone-accessible safety planning services. In both arms, victims of IPV have access to these services via Internet access; the experimental group's service has the additional features of provided feedback on their danger risk via the DA, an assessment of priorities, and a personalized safety plan with information and resources [77]. Such web-based or application services may directly empower IPV victims without the traditional barriers posed by accessing and using healthcare resources.

Policy Interventions

Firearm Interventions

On a larger scale, it is also important to recognize the opportunity for public policy to impact IPH when it influences known risk factors. It is cited that approximately 50% of all female-victim cases of IPH in the USA are firearm related; several studies comparing different states have shown

inverse associations between the presence of firearm-control policies and associated rates of female-victim IPH [77–81]. In reviewing data from 49 cities across the USA from 1979 to 2003, state statutes restricting those under domestic violence restraining orders (DVROs) from accessing firearms and laws allowing the warrantless arrest of DVRO violators are associated with reductions in total and firearm IPH [80]. When looking only at female IPH from NVDRS data from 2015 compiled across 27 states, jurisdictions with high firearm restrictions show a significant decrease in the firearm-to-non-firearm IPH ratio, whereas states with few of these restrictions have higher ratios [78]. Using FBI reports from 1991 to 2015, looking at the effect of the association between state IPV-related firearm laws and IPH rates, state laws that prohibit persons subject to IPV-related restraining orders from possessing firearms and also requiring them to relinquish firearms in their possession were associated with 9.7% lower total IPH rates and 14.0% lower firearm-related IPH rates than in states without these laws [82]. A quantitative policy evaluation using annual state-level data from 1980 through 2013 for 45 US states showed that DVRO firearm-prohibition laws are associated with 10% reductions in IPH [81]; statistically significant protective associations were evident only when restraining order prohibitions covered dating partners (appx. 11%) and ex-partner orders (appx. 12%). Laws prohibiting access to those convicted of nonspecific violent misdemeanors were associated with a 24% reduction in IPH rates; there was no association when prohibitions were limited to domestic violence. Permit-to-purchase laws were associated with 10% reductions in IPHs [81]. These findings collectively show strong evidence for an association between limiting firearm access, especially for those with DVROs and a previous history of violent misdemeanors, and a decrease in IPH rates across multiple parts of the country.

Discussion

IPH remains a global challenge, with current research focused on identifying those who are at risk; how those individuals interact with healthcare systems; and what measures have been put in place to intervene, provide safety, and empower potential victims. While IPH is often a lethal consequence of IPV, studies have shown identifiable risk factors that can differ from those for other forms of IPV. IPH disproportionately affects female victims and occurs over a wide range of ages, with possibly different manifestations later in life (e.g., neglect of elders). A large proportion of homicides during pregnancy stem from IPH, and IPV during pregnancy may raise the risk of lethal violence either pre- or postpartum. The risk of lethal IPV also varies according to the victim's and perpetrator's migration histories, as one's access to formal and informal sources of support may vary according to cultural norms and local communities. Furthermore, the risk of IPH appears to vary across both urbanicity and socioeconomic stability. Both of these factors may have unique interactions in different contexts, as socioeconomic stability in rural settings may affect the risk of IPV/IPH differently when compared to urban settings. There is also a need for more research into IPH across diverse settings, such as in same-sex relationships and for victims who identify as transgender or gender non-binary, as well as from indigenous and other marginalized populations. Several studies, such as the AzIPH study, have shown the promise of parsing out more nuanced risks for IPH across underrepresented communities by combining multiple study methods, from local medical examiner data analysis to interviews with next-of-kin.

There is also the challenge of better understanding how vulnerable individuals interact with healthcare systems, and how healthcare systems can better assess risk and intervene. Importantly, not all victims and perpetrators of IPH accessed healthcare for a significant period of time preceding the homicide, and qualitative data suggests that patients experience barriers to help even when accessing healthcare; there is both personal risk and uncertainty in regard to how recorded information affects IPV re-victimization. While there has been much work to create IPH risk assessment tools, there is a need to innovate alternative means of outreach outside of screening in healthcare settings. Promising directions include equipping first responders to IPV with risk assessment training and collaborations with advocacy groups, as well as empowering those at risk through Internet-accessible safety resources.

One area of potential success involves policies that have limited firearm access to those who have previously committed a domestic violence restraining order (DVRO) or violent misdemeanors. Several studies have indicated negative associations between the stringency of firearm restrictions and IPH rates, with greater stringency resulting in decreased cases. It is well known that firearm use is frequently involved in cases of IPH, and while none of these studies indicates causality, it may nonetheless represent a successful policy intervention on a risk factor for lethal IPV. Future directions may look at the impact of other types of interventions or programs that are meant to protect IPV victims at the time of a violent offense.

In conclusion, IPH threatens the lives of many who are often already in vulnerable positions or have already suffered from violence in intimate relationships. There are identifiable risk factors that may exist both within the relationship and in the greater surrounding environment, yet there also remain many understudied settings in which not enough is known to properly assess risk. There are opportunities to improve outreach to vulnerable individuals within and

outside of the healthcare setting, which involves engaging victims themselves and other sources of support. Finally, the impact of policies controlling firearm access to those with a past history of violence should inspire future policy directions for reducing risk when there is a history of violence in a relationship. Taken together, this review suggests that there are still challenges in identifying and preventing IPH, yet within these challenges remain possibilities to innovate more informed interventions that empower, protect, and prevent.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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